

AUGUST

August 2: STS 51: ORDNANCE OPERATIONS COMPLETED

At Launch Complex 39B, technicians have completed ordnance operations for STS 51. SRB auxiliary power unit hot firing inspections are finished as are aft engine compartment closeouts. Workers at the pad are occupied with servicing the newly replaced right hand solid rocket booster auxiliary power unit with hypergolic fuels. The results were positive from the SRB APU hot firing. Today pad workers charged the battery of the Advanced Communications Technology Satellite and installed the solid rocket booster (SRB) thermal curtain. Launch countdown preparations began and the countdown has been rescheduled to begin at 9:30 a.m. August 9. On Friday, July 30, NASA mission managers decided to postpone the launch of Discovery on Mission STS 51 until August 12; the delay is due to concerns regarding the Perseid meteor shower which is expected to peak on the evening of August 11. [Harwood, THE WASHINGTON POST, p. A4, July 31, 1993; Broad, THE NEW YORK TIMES, July 31, 1993; KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, August 2, 1993.]

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STS 58: LANDING GEAR CHECKS MADE

Technicians in Orbiter Processing Facility bay 2 have completed the crew equipment interface test for Columbia's STS 58 mission; the Orbiter/tunnel 'C' hatch has been installed and inspected; freon coolant loop adjustments have been made and checks have been completed and the landing gear functional checks are finished. Today Orbiter aft and mid-body closeouts are in process as are Spacelab closeouts and final payload bay cleaning. STS 58 work scheduled: crew module with Spacelab leakage tests; closing of the payload bay doors and a frequency response test. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, August 2, 1993.]

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STS 61: HUBBLE MISSION

Ammonia system leak and functional checks and landing gear wheel and tire assembly installation have been completed on Endeavour. The fifth cryogenic tank set is being installed in Endeavour for its STS 61 mission; checks are being made of the vehicle's orbital maneuvering system functions and workers are conducting payload integration operations. Main propulsion system leak and functional checks are scheduled. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, August 2, 1993.]

August 3:

ACTS BATTERY DISCHARGED

Workers at Launch Complex 39B have completed the Advanced Communications Technology Satellite (ACTS) battery discharge and aft engine compartment closeouts as part of their preparations for launching Discovery on STS 51 on August 12. Today, workers will be making accelerometer polarity adjustments to ACTS; they'll install the solid rocket booster (SRB) thermal curtain and complete SRB aft skirt firming. They will also continue work to closeout the crew compartment of the Shuttle. STS 51 work scheduled: transfer orbit stage (TOS) state-of-health checks; ORFEUS argon servicing; ACTS battery charging; launch countdown preparations; and starting the countdown on August 9 at the T-43 mark. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 3, 1993.]

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STS 58: CEIT COMPLETED

Columbia's crew equipment interface test (CEIT) has been completed in OPF Bay 2; the eldest of the Space Shuttle fleet is being readied for a mid-September STS 58 mission. Orbiter/tunnel 'C' hatch installation and inspections have been completed as have freon coolant loop adjustments and checks. Workers have finished landing gear functional checks as well. Today processing technicians are conducting Orbiter aft and mid-body closeouts; Spacelab external closeouts; crew module/Spacelab leakage tests and final payload bay cleaning. The payload bay doors are scheduled for closing and the frequency response test is also on the upcoming work agenda. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 3, 1993.]

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STS 61: AIMING FOR EARLY DECEMBER

Despite the delays in launching Discovery on its STS 51 mission in the past thirty days, Endeavour continues to be on track for its December STS 61 mission. Workers have completed landing gear wheel and tire assembly installation. Currently workers are preparing for 5th cryogenic tank set installation; orbital maneuvering system functional checks; payload integration operations and radiator functional checks. Workers are also scheduled to undertake main propulsion system leak and functional checks. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 3, 1993.]

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KSC QUIETER DUE TO DELAYS

"It's not like we've got a ghost town out here," according to KSC spokesman **Bruce Buckingham**. "It's just not as hectic as it's been over the last several weeks." Discovery was to have begun its STS 51 mission tomorrow morning; the liftoff was delayed due to the current activity of an annual phenomenon called the

Perseid Meteor Shower. For now, the launch is planned to occur between 9:10 a.m. and 10:07 a.m. on August 12; launch countdown is to begin at T-43 hours at 9:30 a.m. August 9. Meanwhile, engineers are checking the rocket motor in the Shuttle's cargo bay; the motor was built by Orbital Sciences Corp. and is called the Transfer Orbit Stage (TOS). [Banke, FLORIDA TODAY, p. 4A, Aug. 4, 1993.]

August 4:

STS 51: AFT SKIRT FOAMING

At Launch Complex 39B, technicians have completed the Aft skirt foaming operations as a prelude to Discovery's August 12 launch. Aft engine compartment confidence checks and ACTS accelerometer polarity adjustments have been made. Today, workers are installing the SRB thermal curtain; conducting crew compartment closeouts; check the state-of-health checks on the Transfer Orbit Stage (TOS) in the vehicle's payload bay and readying for launch countdown. STS 51 work scheduled: ORFEUS argon servicing; battery charging for the Advanced Communications Technology Satellite (ACTS) and preparing for the countdown to begin on August 9. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 4, 1993.]

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STS 58: EDWARDS AFB LANDING

Columbia's STS 58 mission is scheduled to land at Edwards Air Force Base, CA, after its 14 days in orbit. The Edwards landing is necessitated by the great weight of the Spacelab cargo. The crew equipment interface test has been completed as have the freon coolant loop adjustments and checks. Currently, workers are conducting aft, forward and mid-body closeouts; Spacelab external closeouts; crew module with Spacelab leakage tests; final payload bay cleaning. STS 58 work scheduled: closing the payload bay doors; frequency response testing; Ku-band antenna stowage. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 4, 1993.]

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STS 61: HUBBLE SERVICING MISSION

Barring further setbacks in the Shuttle schedule, Endeavour will launch on its STS 61 mission in early December to attempt a repair of the Hubble Space Telescope. Processing technicians in OPF bay 1 have completed radiator functional checks and landing gear wheel and tire assembly installation. Work in progress: 5th cryogenic tank set installation; orbital maneuvering system functional checks; main propulsion system leak and functional checks; payload integration operations. Orbiter hydraulic system checkouts are scheduled. The STS 61 mission is scheduled to last for 11 days and will involve a crew of 7 at an orbital altitude (356 miles) nearly twice as high as most Shuttle missions. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 4, 1993.]

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STS 51: BEACH CLOSING

Playalinda Beach will be closed to the public beginning August 8 at dusk due to next week's planned launch of the Space Shuttle Discovery on its STS 51 mission. Given a successful launch August 12, the beach will reopen to the public at 6 a.m. the next day. Launch of Discovery is set for 9:10 a.m. EDT on the 9th. The countdown leading to the 57th Space Shuttle flight is set to begin at 9:30 a.m. August 9; safety and security concerns require that Playalinda Beach be closed to the public throughout the majority of a Space Shuttle launch countdown. Other Canaveral National Seashore beaches, such as Apollo Beach, will not be affected by the referenced closing and will remain open during Discovery's launch. These beaches may be reached through the seashore's north beach entrance, located south of New Smyrna Beach. [NASA/KSC Release No. 94-93, Aug. 4, 1993.]

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NEW SAFETY RULES TO BE IMPLEMENTED

When a botched test knocked out some systems aboard Endeavour during its June mission (STS 57), NASA began a review process which will lead to new safety rules being implemented. NASA created a Safety Advisory Board to study the incident which involved the sending of a wrong command to Endeavour. The signal resulted in a motor and fan short circuiting. The six astronauts aboard the vehicle were not endangered. "In the future, when we're staring something in the face that we haven't seen before, we want to make sure the process we have in place to deal with that is a zero-error type of thing," said NASA Flight Director **Lee Briscoe**. NASA's Congressional watchdog is the Aerospace Safety Advisory Panel; member **Seymour Himmel** said, "One of the inherent dangers in special procedures is that it's new. It's important to do everything you can to make checks and double checks. If they have found there wasn't sufficient review, then I think [the new Safety Advisory Board's] recommendations makes sense." [Banke, FLORIDA TODAY, p. 1A, Aug. 5, 1993.]

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FLORIDA PANTHERS SIGHTED IN REFUGE

The fish and Wildlife Service Office at the Merritt Island National Wildlife Refuge gets weekly, sometimes daily, telephone calls from Kennedy Space Center workers who believe they have spotted an endangered Florida Panther on the land which serves both the Refuge and the space center. No evidence of Panther has yet been discovered on the 14,000-acre wildlife refuge - no tracks or tree scratches or other signs have been seen. KSC electrical engineer **Tim Mallow** doesn't claim to have seen a Florida Panther here at the space center either, but believes the reports of sightings. As founder and president of the Coryi Foundation - the cat's scientific name is *Felis concolor coryi* - Mallow devotes much of his spare time to saving and studying the panther. "When you consider that panthers have a range of 200 square miles and the fact that we know there are panthers within 50

miles of KSC, there's no reason why there wouldn't occasionally be a panther or two on the space center," Mallow said. "I think the sightings speak for themselves, but word alone is not enough."

The effort conclusively to determine whether Florida Panthers actually do roam the Kennedy Space Center recently led Mallow and a friend to erect a remote camera on the south side of the space center. Triggered by a combination of heat and motion, the 35 millimeter camera is set to photograph any mammal which crosses in front of the lens. "We're pretty excited to be given the chance to setup a camera on KSC," Mallow remarked. "Panthers have such a tremendous range, and there are more than 140,000 acres of land on the space center, but we feel we've selected a potentially good site," he continued. "It's a big challenge, but we're willing to stick it out and keep looking for panthers as long as the Fish and Wildlife Service will let us." FWS Biologist **Harvey Hill** said, "Tim enjoys a good reputation for working with panthers, and that's the main reason we approved his request. We're within the traditional traveling range of panthers, but have never been able to find any conclusive evidence of their presence on the refuge. Frankl I would be surprised if Tim finds one, but nothing would tickle me any more than getting a picture of a panther on our refuge." [NASA/KSC Release No. 93-93, Aug. 4, 1993.]

August 5:

STS 51: AFT SKIRT FOAMING

Workers at Launch Complex 39B have completed foaming of the SRB aft skirt trailing edges and installing the solid rocket booster thermal curtain in preparation for the August 12 launch of Discovery. They are on schedule in their pre-launch processing efforts. Work in progress: crew compartment closeouts; argon servicing of ORFEUS spacecraft; launch countdown preparations. STS 51 work scheduled: Advanced Communications Technology Satellite (ACTS) batter charging tomorrow; start of countdown August 9 at 9:30 a.m.; the five astronauts of the STS 51 mission will arrive at the Shuttle Landing Facility about 3 p.m. EDT, August 9. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 5, 1993; Banke, FLORIDA TODAY, p. 7A, Aug. 6, 1993.]

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STS 58: AFT COMPARTMENT CLOSED OUT

The Space Shuttle Columbia, which remains in OPF Bay 2, continues to be readied for rollover to the VAB as a first step on its STS 58 mission scheduled currently for mid-September. Technicians have completed the aft compartment closeouts; freon coolant loop adjustments and checks and the Ku-band antenna has been stowed for flight. Current STS 58 activities: Orbiter forward and mid-body closeouts; Spacelab external closeouts; crew module with Spacelab leakage tests and final payload bay cleaning. Scheduled activities include: closing payload bay

doors; frequency response test; rollover from the Orbiter Processing Facility to the Vehicle Assembly Building early in the evening on August 9. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 5, 1993.]

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STS 61: CRYO TANK SET INSTALLED

Endeavour's STS 61 mission is dedicated to servicing the Hubble Space Telescope; it is targeted to launch in early December and will last 11 days. Radar frequency and power checks have been completed during the processing activities now underway in OPF Bay 1. In addition, technicians have removed and installed drag chute hardware and installed the 5th cryogenic tank set. Currently, technicians are making orbital maneuvering system functional checks; main propulsion system leak and functional checks; and conducting payload integration operations. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 5, 1993.]

August 6:

STS 51: CLOSEOUTS FOR FLIGHT

In anticipation of launching on August 12, Discovery's pre-launch preparations included closeouts of the solid rocket boosters, the aft main engine compartment and of the external tank. Work in progress: start of launch countdown at 9:30 a.m. August 9; repressurization of OMS pods with gaseous nitrogen; return of astronauts to Kennedy Space Center from JSC (Houston, TX); payload closeouts; closure of payload doors August 9 and loading of cryogenic propellants August 10. STS 51 work scheduled: ACTS battery recharging; preparations to repressurize OMS pods with gaseous nitrogen; countdown preparations in Firing Room 1. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 6, 1993; Banke, FLORIDA TODAY, p. 2A, Aug. 7, 1993; Date, THE ORLANDO SENTINEL, p. A-4, Aug. 7, 1993.]

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STS 58: COLUMBIA ROLLOVER PREPARATIONS

Preparations for the STS 58 launch continue on schedule. The Spacelab SLS-2 module has been closed out for flight and the payload bay doors were closed last night. The aft compartment and mid-body closeouts are complete. The positive pressure check of the aft and the orbiter structural leak check have been successfully performed. Weight and center of gravity determination will begin August 9. Rollover is targeted for 12:01 a.m. August 12. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 6, 1993.]

August 8:

MET-CON, INC. CONTRACT

McDonnell Douglas Aerospace at Kennedy Space Center has awarded Met-Con, Inc. (Cocoa, FL) a contract to install and activate systems and ground support equipment for the new space station processing facility at KSC. The contract is worth \$8.2 million and runs through December 31, 1995; it has two options that might be exercised during 1994 and 1995, according to McDonnell Douglas spokeswoman **Deborah Duschl**. Some work also will be done on facilities at Cape Canaveral Air Force Station. ["KSC Contracts With Cocoa Firm," FLORIDA TODAY, p. 10E, Aug. 8, 1993.]

August 9:

STS 51: LAUNCH MINUS 3 DAYS

An upper level trough is expected to develop in the Eastern U.S. in conjunction with a ridge of high pressure over northern Florida. The resulting increase in moisture together with the high pressure southeasterly wind pattern will bring a chance for morning offshore shower or thundershower activity with a chance of local thunderstorms by the end of the week. At the opening of the launch window at 9:10 a.m. August 12, the forecast conditions are low scattered to broken clouds, visibility of 7 miles or greater, wind at the pad expected to be from the southeast at 5 to 7 knots. Temperature at launch time is predicted to be 83 degrees, dewpoint at 70 degrees and humidity at 69%. There is a chance of showers moving into the launch area from offshore. There is a 20% chance of launch weather criteria violation and a 0% chance of a tanking criteria violation. [Banke, FLORIDA TODAY, p. 1A, Aug. 8, 1993; LAUNCH WEATHER FORECAST FOR STS 51: L-3 Days, Aug. 9, 1993.]

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STS 51: COUNTDOWN BEGINS

The countdown for launch of the Space Shuttle Discovery on mission STS 51 began as scheduled today at 9:30 a.m. EDT, at the T-43 hour mark. This marks the beginning of the third launch attempt of the Orbiter Discovery since the launch was scrubbed on July 17 and 24 due to technical problems. Additionally, launch was postponed from August 4 until August 12 due to concerns regarding the Perseid meteor shower which is expected to peak on the evening of August 11. The countdown includes 28 hours and 40 minutes of built-in hold time leading to the opening of the launch window at 9:10 a.m. (EDT) on August 12. The 57 minute window extends until 10:07 a.m. The five-member crew of STS 51 is expected to arrive in their T-38 training jets at the Shuttle Landing Facility at approximately 3:00 p.m. The crew includes Commander **Frank Culbertson**, Pilot **William Readdy** and Mission Specialists **Jim Newman**, **Dan Bursch** and **Carl Walz**. A primary objective of this mission is the deployment of the Advanced Communications Technology Satellite (ACTS) and the Transfer Orbit Stage (TOS). ACTS/TOS is the latest in NASA's series of advanced communications

satellites and a test-bed for technology which will be used in future operational satellites. Also, the Orbiting Retrievable Far and Extreme Ultraviolet Spectrometer-Shuttle Pallet Satellite (ORFEUS-SPAS) payload will be deployed and retrieved during this mission. Also on board is the IMAX camera, the Commercial Protein Crystal Growth (CPCG) experiment, and Chromosome and Plant Cell Division in Space (CHROMEX) experiment. In addition, astronauts Jim Newman and Carl Walz are scheduled to perform a six hour spacewalk on the fifth day of the mission as a continuation of a series of test spacewalks to increase experience and refine training methods. They will work with several tools that may be used during the servicing of the Hubble Space Telescope mission later this year.

Today in Firing Room 1 of the Launch Control Center, the KSC launch team is verifying systems to assure that the Shuttle is powered up and that the data processing and backup flight control systems are operating trouble free. Verifications will occur throughout the count to ensure reviews of the flight software stored in the Orbiter's twin memory banks is being conducted, computer controlled display systems are being activated, and the backup flight system general purpose computer is being loaded. Operations are also underway to prepare the Orbiter for on-board cryogenic loading. Later, Orbiter navigation aids will be turned on and tested and the inertial measurement units will be activated. Also today, ground crews are making the final storage of mid-deck and flight deck supplies and payloads. They will also perform microbial samplings of the flight crew's drinking water and check water levels in the crew waste management system. The STS 51 crew is scheduled to arrive at KSC at about 3 p.m. today. At T-27 hours, the countdown will enter its first built-in hold. This is an eight hour hold lasting from 1:30 to 9:30 a.m. Tuesday, August 10. When the countdown resumes, the launch pad will be cleared of all personnel in preparation for cryogenic fuel loading of the power reactant and storage distribution system tanks located under the payload bay lining. These tanks hold the super-cold liquid hydrogen and liquid oxygen reactants used by the fuel cells to provide electricity to the Orbiter and drinking water for the crew. Cryogenic flow is scheduled to start at about 11:30 a.m. August 10 and continue for about five hours. As servicing of the cryogenic tanks concludes, the clock will enter another built-in hold at the T-19 hour mark. This hold will last for four hours from 5:30 to 9:30 p.m. August 10.

Following cryogenic loading operations, the pad will be reopened for normal work and the Orbiter mid-body umbilical unit used to load the super-cold reactants in the Orbiter's fuel cell tanks will be demated and retracted into the launch structure. When the countdown resumes, technicians will complete final vehicle and facility closeouts and begin activating the Orbiter's communications systems and configuring Discovery's cockpit for flight. The Orbiter's flight control system and navigation aids will be activated. The stowable crew seats will be installed in the

flight and mid-decks. The countdown will enter a built-in at the T-11 hour mark at 5:30 a.m. Wednesday. This 13 hour, 20 minute hold will last until 5:30 a.m. Wednesday (August 11). This 13 hour, 20 minute hold will last until 6:50 p.m. During this hold, time critical equipment will be installed in the Orbiter's cockpit and the inertial measurement units will be activated and warmed up. At about 11 a.m. Wednesday, the Rotating Service Structure is scheduled to be moved away from the vehicle and placed in launch position. At T-9 hours, about 8:50 p.m. Wednesday, the onboard fuel cells will be activated. At T-8 hours, the launch team will begin evacuating the blast danger area and clear the pad for loading the external tank with the super-cold cryogenic fuels. At T-7 hours, 30 minutes, conditioned air that is flowing through the Orbiter's payload bay and other areas on the Orbiter will be switched to gaseous nitrogen in preparation for fueling the external tank. The inertial measurement units will transition from the warm up stage to the operate/attitude determination mode at T-6 hours, 45 minutes.

The countdown will enter another planned built-in hold at the T-6 hour mark at 11:50 p.m. During this one-hour hold, final preparations for loading the external tank will be completed and a pre-tanking weather briefing will be conducted. Chilledown of the lines that carry the cryogenic propellants to the external tank begins when the clock starts counting again at 12:50 a.m. August 12. Filling and topping off the external tank should be complete at the beginning of the next planned hold at T-3 hours, or 3:50 a.m. During the two-hour hold at T-3 hours, an ice inspection team will conduct a survey of the external tank's outer insulation and other Shuttle components. Also the closeout crew will be dispatched to the pad and begin configuring the crew module and white room for the flight crew's arrival. Liquid oxygen and liquid hydrogen will be in a stable replenish mode during this time to replace any propellant that "boils" off. During the hold at T-3 hours, the five-member STS 51 crew will be awakened at about 4 a.m. Following breakfast, the crew will receive a briefing on weather conditions both at KSC and around the world via satellite from Mission Control, Houston. The flight crew will suit-up in their partial pressure suits, then leave the Operations and Checkout Building during the T-3 hour hold, or at about 5:40 a.m. They will arrive at the pad's white room at about 6:10 a.m. where they will be assisted by white room personnel in getting into the crew cabin. Just prior to the T-1 hour mark, the test team and the flight crew will get another weather update, including observations from astronaut Robert "Hoot" Gibson flying in a Shuttle Training Aircraft in the KSC area.

The last two built-in holds will be 10 minutes in duration and will occur at the T-20 minute mark, or at 8:30 a.m., and at the T-9 minutes mark at 8:51 a.m. During the final hold, the flight crew and ground team receive the NASA launch director's and mission management team's final "go" for launch. Milestones after the T-9 minute mark include start of the ground launch sequencer; retraction of the Orbiter access arm at T-7 minutes, 30 seconds; start of the Orbiter's auxiliary power units

at T-5 minutes; pressurization of the liquid oxygen tank inside the external tank at T-2 minutes, 55 seconds; pressurization of the liquid hydrogen tank at T-1 minute, 57 seconds; and the electronic "go" to Discovery's onboard computers to start their own terminal countdown sequence at T-31 seconds. The Orbiter's three main engines will start at T-6.6 seconds. [NASA/KSC News Release No. 98-93, Aug. 9, 1993; KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 9, 1993; Banke, FLORIDA TODAY, p. 1A, Aug. 9, 1993; Banke, FLORIDA TODAY, p. 1A, Aug. 10, 1993; "Countdown No. 3 Begins for Space Shuttle Mission," THE WASHINGTON POST, Aug. 10, 1993.]

August 10:

STS 51: LAUNCH MINUS 2 DAYS

The countdown for Discovery's STS 51 launch continues without problem today. The pad will be closed for most of today for the loading of the onboard cryogenic tanks with the liquid hydrogen and liquid oxygen reactants. These reactants provide electricity to the Orbiter is in space and drinking water for the crew. The pad was closed to all personnel at about 9:30 a.m. Cryogenic flow is expected to begin about 11:30 a.m. and last for about 5 hours. Following this operation the Orbiter mid-body umbilical unit will be demated, Orbiter communications activation will start and final vehicle and facility closeouts will begin. Tomorrow, preparations will be made to retract the rotating service structure to launch position at about 11 a.m. Tanking is scheduled to begin at about 12:30 a.m. August 12. The payload bay doors were closed yesterday at 5:30 p.m. following the completion of all payload bay operations. Two mid-deck experiments will be installed into the Orbiter tomorrow. The Commercial Protein Crystal Growth (CPCG) experiment will be installed at 9 a.m. and the Chromosome and Plant Cell Division in Space (CHROMEX) experiment will be installed beginning at about 6 p.m.

Forecasters indicate a 30 percent probability of weather prohibiting launch with the primary concerns being possible offshore thunderstorms and a low cloud ceiling. The winds at the pad are expected to be from the southeast at 8 to 12 knots; temperature 83 degrees F.; visibility 7 miles; and clouds scattered to broken at 2,500 and 25,000 feet. The 24-hour and 48-hour delay forecast reveal similar conditions with 30 percent and 20 percent chance of violation respectively. The five-member astronaut crew for this mission arrived at KSC's Shuttle Landing Facility yesterday at about 2:30 p.m. Today they will be involved with checking out their mission plans and fit checks of their equipment. They are scheduled for some free time this afternoon and will be ready for sleep at about 6:30 p.m. They will be awakened tomorrow at about 2:30 a.m. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT: MISSION STS 51 -- ACTS-TOS/ORFEUS-SPAS LAUNCH MINUS 2 DAYS, Aug. 10, 1993.]

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STS 51: AN EXTRA DAY LIKELY

The Space Shuttle Discovery may get an extra day in space because of a classified military operation, according to Lt. Dave Honchul, a spokesman for the Air Force's 45th Space Wing. "There is an activity that was previously scheduled on the range that will preclude a Shuttle landing prior to the 22nd. It's classified; I can't talk about it," he said. [Halvorson, FLORIDA TODAY, p. 1A, Aug. 11, 1993.]

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FIRE CAUSED BY LIGHTNING

Lightning started a fire and closed State Road 3 this afternoon; the acrid smoke from the fire welled up east of SR 3 about 2:15 and burned late into the night. More than 500 acres of trees and undergrowth were consumed by the fire on both sides of the road. According to KSC spokesman **Mitch Varnes**, the fire was under control by about six p.m. Some KSC workers who departed the center after four o'clock were unable to proceed south on SR 3; it was closed due to the smoke. "The land hadn't been cleared for several years as far as controlled burns go, so it was ripe for a fire," Varnes said. ["Lightning Sparks Fire at KSC, West of I-95," FLORIDA TODAY, p. 1B, Aug. 11, 1993.]

August 11:

STS 51: LAUNCH MINUS 1 DAY

The countdown for Discovery's launch continues today. Managers and engineers decided late last night to replace a faulty liquid oxygen temperature sensor on main engine #1 following erratic temperature readings. Workers entered the aft engine compartment earlier this morning to remove and replace the sensor. It is expected the aft compartment will again be closed for flight by mid to late afternoon. Following aft compartment closeouts, an aft confidence test will be run and preparations made to retract the rotating service structure to launch position at about 7 p.m. today. At about 10 p.m. the pad will be cleared as preparations are made to load the external tank with liquid hydrogen and liquid oxygen propellants. Loading is scheduled to begin at about 12:30 a.m. August 12.

Two mid-deck experiments will be installed into the Orbiter today. The Commercial Protein Crystal Growth (CPCG) experiment will be installed by 11 a.m. and the Chromosome and Plant Cell Division in Space (CHROMEX) experiment will be installed by about 8 p.m. Forecasters continue to indicate a 30 percent probability of weather prohibiting launch with the primary concerns being possible offshore thunderstorms and a low cloud ceiling. The winds at the pad are expected to be from the southeast at 6 to 10 knots; temperature 83-85 degrees F.; relative humidity 70-75 percent; visibility 7 miles; and clouds scattered to broken at 2,500, 12,000 and 25,000 feet. The 24-hour and 48-hour delay forecast reveal similar conditions with 20 percent and 10 percent chance of violation respectively.

The five astronauts for this mission are reviewing their flight data files today. They will also take part in Orbiter and payload briefings and fly in their T-38 training aircraft prior to preparing for sleep at about 6:30 p.m. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT: MISSION: STS 51--ACTS-TOS/ORFEUS-SPAS LAUNCH MINUS 1 DAY, Aug. 11, 1993; LAUNCH WEATHER FORECAST FOR STS 51, Aug. 11, 1993.]

II

HST HARDWARE ARRIVES AT KSC

Preparations for the first servicing mission of the Hubble Space Telescope (HST) began today at KSC with the arrival of the Space Support Equipment (SSE). Some of this flight hardware will house the delicate Hubble replacement components inside Endeavour's payload bay during the mission. The SSE was shipped from Baltimore on August 6, after a checkout at NASA's Goddard Space Flight Center (Greenbelt, MD). Traveling aboard the Space Shuttle external tank barge, the hardware is enclosed in shipping containers previously used by the Gamma Ray Observatory (GRO) and the Long Duration Exposure Facility (LDEF). After being offloaded from the barge, the equipment will be taken to the Payload Hazardous Servicing Facility (PHSF) located in KSC's Industrial Area for launch preparations. One of the significant processing milestones will take place in mid-September when the Hubble replacement components, including the Wide Field/Planetary Camera II and Hubble corrective optics, are mated with their carriers. Astronauts will install these components on the 43-foot-long, 14-foot diameter HST during the mission. The SSE consists of three parts: the Orbital Replacement Unit Carrier which is a dedicated Spacelab maintenance and repair pallet; the Solar Array Carrier which will hold the replacement solar panels; and the Flight Support Structure which will hold and orient the telescope while it is being repaired by the astronauts in Endeavour's payload bay. This device was used previously aboard the Space Shuttle Challenger in 1984 during the Solar Maximum Satellite repair mission. Replacement components for the Hubble Space Telescope are scheduled to arrive at KSC later this month. Mission STS 61 is a planned 11-day flight featuring five spacewalks with seven crew members dedicated to the servicing of the Hubble Space Telescope. Launch is currently targeted for early December. [NASA/KSC Release No. 97-93, Aug. 11, 1993.]

August 12:

THIRD DISCOVERY SCRUB

The main engines of the Space Shuttle Discovery cut off three seconds before launch due to a problem with a sensor that monitors fuel flow through main engine number 2. The time of the cutoff was 09:12:32 EDT. There are two sensors which are part of the flow meter that monitor the flow of hydrogen through the main engine. Each sensor has a Channel A and Channel B for a total of four readings. These sensors are monitoring the fuel flow from main engine ignition through main engine cutoff. The sensors are redundant so that all four

channels must report an acceptable fuel flow rate prior to liftoff. Data indicates that Channel A on the number two sensor failed. There was no electrical output at all from this sensors while the others were found to have operated normally. A completely redundant set of measurements is required to commit to flight.

At this time it is not known when Discovery will be launched, but there will be a delay of at least three weeks. The STS 51 astronauts returned to Houston this afternoon. The rotating service structure providing the primary access and weather protection for Discovery will be rotated into position around the vehicle tomorrow after boiloff of residual propellant in the external tank is complete. After the cryogenic reactants have been offloaded from the power reactant storage and distribution system (PRSD) tanks, the pad will be re-opened for normal about mid-day Friday (August 13). The delays in launching Discovery already have meant that one of the two showcase Shuttle flights planned for the fall will be bumped into 1994. The joint venture with Russian astronaut Sergei Krikalev was to have been flown in mid-November; the Hubble Space Telescope repair mission had been scheduled for December. [STS 51 Discovery Status, 4:30 p.m., Aug. 12, 1993; Halvorson, FLORIDA TODAY, pp. 1A-2A, Aug. 13, 1993; Halvorson, FLORIDA TODAY, p. 1A, Aug. 12, 1993; Halvorson, FLORIDA TODAY, pp. 1A-2A, Aug. 12, 1993; Banke, FLORIDA TODAY, p. 13A, Aug. 13, 1993; Date, THE ORLANDO SENTINEL, pp. A-1 & A-6, Aug. 13, 1993; Date, THE ORLANDO SENTINEL, Aug. 13, 1993; Halvorson, FLORIDA TODAY, p. 13A, Aug. 13A, Aug. 13, 1993; "4th Delay," USA TODAY, p. 3A, Aug. 13, 1993; Broad, THE NEW YORK TIMES, Aug. 13, 1993; Merzer, THE SUN, Aug. 13, 1993; Harwood, THE WASHINGTON POST, p. A8, Aug. 13, 1993; "Shuttle's Engine Cut 3 Seconds to Launch," THE WASHINGTON TIMES, p. A3, Aug. 13, 1993; "Onboard computers aborted....," THE WALL STREET JOURNAL, Aug. 13, 1993; Halvorson, FLORIDA TODAY, p. 1A, Aug. 14, 1993.]

II

4TH SHUTDOWN IN 9 YEARS

When Discovery's launch controllers shut down the vehicle's main engines today, it marked the fourth such incident in 9 years and more than fifty Space Shuttle flights. On June 26, 1984, Discovery's launch attempt halted four seconds before liftoff due to a faulty fuel valve inside a main engine. The Shuttle had to be rolled back from the launch pad for repairs and a delay of 64 days. On July 29, 1985, Challenger's liftoff came within three seconds of occurring when the attempt was aborted; the culprit was a faulty coolant valve in one of the main engines. The delay was 17 days. On March 22, 1993, at T-3 seconds, Columbia's launch was aborted; a liquid oxygen valve leaked inside a main engine. NASA managers decided to replace all three main engines at the pad; the delay was 33 days. [Banke, FLORIDA TODAY, p. 13A, Aug. 13, 1993.]

II

STS 51: ENGINE REMOVAL PREPARATIONS

At Launch Complex 39B, workers are preparing to remove all three Space Shuttle Main Engines (SSME) and replace them with engines which had been scheduled for use on Endeavour's Hubble Space Telescope repair mission planned for December. Currently workers are disconnecting ordnance devices which separate the Space Shuttle from its SRBs and external tank. On the 17th the SSME heatshields will be removed and the engine removal process starts on the 18th. NASA officials are talking about launching Discovery now in the first or second week of September. [Halvorson, FLORIDA TODAY, p. 1A, Aug. 14, 1993; Halvorson, FLORIDA TODAY, p. 2A, Aug. 15, 1993.]

August 16:

STS 51: POST-SCRUB TURNAROUND

At Launch Complex 39B a number of post-scrub tasks have been completed: installation of engine service platforms under the vehicle; extension of the rotating service structure around the Orbiter; Orbiter mid-body umbilical mate and leak checks; off load onboard cryogenic reactants; open aft engine compartment and install work platforms; ACTS batter discharge; open payload bay doors; removal and replacement of faulty fuel flow sensor; repositioned main engines and aerosurfaces; disconnect ordnance. Today workers are engaged in post-scrub turnaround and securing operations; defoaming main engines and removing main engine heatshields. STS 51 work scheduled: removal and replacement of all three main engines at the pad; service of ORFEUS/SPAS with liquid argon; ACTS/TOS health checks. Unofficially, NASA's target date for the next Discovery launch attempt is September 10. Determination of an official launch date will be impacted by a crowded Eastern Test Range launch schedule. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 16, 1993.]

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STS 58: SPACELAB LIFE SCIENCES

In the Vehicle Assembly Building's high bay 3, technicians have hardmated Columbia to its external tank; mechanical mates have also been completed as have been umbilical structural mates and liquid oxygen and liquid hydrogen mates. Today workers are continuing with Orbiter crew module operations. On the processing schedule: Orbiter/external tank electrical mates and a Shuttle interface test. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 16, 1993.]

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HUBBLE SPACE TELESCOPE SERVICING MISSION

In OPF Bay 1, Endeavour is being readied for its upcoming Hubble Space Telescope servicing mission. Orbital maneuvering system functional checks and Ku-band antenna checks have now been completed; the payload doors have been closed. Workers today are installing Endeavour's 5th cryogenic tank set; performing main propulsion system leak and functional checks; payload integration

operations; reopening the payload bay doors and conducting ammonia boiler checks. Master events controller checks are scheduled. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 16, 1993.]

II

COLUMBIA'S ROLLBACK POSSIBLE

The need to service experiment containers in Columbia's payload bay may force NASA manager's to order the Shuttle rolled back to the VAB from LC 39A. KSC spokesman **Glenn Snyder** said, "The problem is those containers were not designed to be opened when the Orbiter and Spacelab are in a vertical position on the ground." The rollback would also allow workers to replace several batteries in other experiments. [Banke, FLORIDA TODAY, p. 4A, Aug. 16, 1993; Banke, FLORIDA TODAY, Aug. 17, 1993.]

August 17:

JSC TO HOST SPACE STATION BOEING TO BE PRIME CONTRACTOR

NASA Administrator **Daniel S. Goldin** today announced that the Johnson Space Center (Houston, TX) has been selected as the host center for the new Space Station Program. Boeing Defense and Space Group has been selected as the prime contractor. The selections are part of the President's initiative to save more than \$4 billion over the next 5 years and more than \$18 billion over the life of the Space Station Program. "These decisions, announced today, mark a significant step forward in carrying out the President's decision to move ahead with a redesigned Space Station," Goldin said. Goldin pointed out that later this week, Space Station managers will provide an interim report to the Office of Science and Technology Policy and the international partners on the design for the Space Station. "The transition process is on track, decisions are being made, and the groundwork for building the new Space Station team is being laid," he said. "I'm extremely pleased with the progress we are making."

The Johnson Space Center (JSC) was selected because of two critical factors. First, JSC has the necessary experience, personnel and facilities to respond flexibly to the Space Station Program needs. And secondly, JSC has a strong operations capability in terms of both the civil service workforce and its extensive facilities. JSC's close proximity to the operations capability is conducive for the evolution of the Space Station Development Program to an Operations Program, thereby driving to lower life cycle costs and promoting stability and efficiency. The new Space Station Program Office will be responsible for managing the design, development and the physical and analytical integration of the Space Station as the program evolves into operations. The new Space Station organizational structure will have about 1,000 civil servants. The program office, consisting of about 300 civil servants, will be located at JSC. The other 700 positions will be spread among all involved NASA centers, including JSC. The JSC Center

Director and management will have no Space Station Program-line management responsibility. The program office will report to NASA Headquarters.

Boeing's role as the provider of the essential Space Station elements necessary to sustain human life - the pressurized laboratory and habitation modules as well as the environmental control and life support system - were the key factors in its selection as prime contractor. Non-selected Space Station prime contractors - Grumman Aerospace Corp., McDonnell Douglas Corp. and Rocketdyne Division, Rockwell International - have agreed to become novated subcontractors to Boeing, whose expertise in complex integration tasks, due to its current role in the integration and the outfitting of the modules as well as the analytical and physical integration of the experiments, made it the logical choice since, as prime, it will be responsible for delivering the full-up Space Station vehicle and for coordinating and integrating the U.S. elements with those provided by the international partners. As the single prime contractor, Boeing will be responsible for the design, development, physical and analytical integration, test, delivery and launch of the Space Station vehicle.

Additionally, Boeing will be responsible for 1 year of sustaining engineering following launch of each launch package, including the appropriate spares. Boeing will also be responsible for management and integration of the Space Station vehicle and will manage the subcontracts. [NASA/KSC NEWS RELEASE: 93-148, Aug. 17, 1993; "Houston Space Center, Boeing Will Oversee Freedom Program," FLORIDA TODAY, p. 1A, Aug. 18, 1993; Banke, FLORIDA TODAY, p. 1A, Aug. 18, 1993; "Houston, Seattle Get NASA Job," THE ORLANDO SENTINEL, pp. A1 & A4, Aug. 18, 1993; Peltz and Miller, LOS ANGELES TIMES/WASHINGTON EDITION, Aug. 18, 1993; Nomani and Cole, THE WALL STREET JOURNAL, p. A12, Aug. 18, 1993; Hoversten, USA TODAY, p. 3A, Aug. 18, 1993; Glater and Mintz, THE WASHINGTON POST, Aug. 18, 1993.]

II

STS 51: PROCESSING UPDATE

Technicians at Launch Complex 39B have finished defoaming Discovery's main engines and removed the heatshields. There has been a successful duplication of the engine sensor failure that led to the August 12 engine shutdown three seconds prior to launch. Today workers are continuing post scrub turnaround and securing operations; preparing to remove main engine #1 and servicing the ORFEUS/SPAS with liquid argon. Scheduled STS 51 work includes removing and replacing all three main engines at the launch pad and conducting ACTS/TOS health checks. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 17, 1993; Halvorson, FLORIDA TODAY, p. 4A, Aug. 18, 1993.]

August 18:

STS 51: BAD SENSOR CAUSED SCRUB

The faulty fuel flow sensor from main engine number 2 that caused the recent scrub of Discovery's launch last week was tested at the manufacturer yesterday. Referring to the failed sensor, Launch Director **Robert B. Sieck** said, "That was the exact cause of the failure. Why and how it happened we don't know." Tests conducted under cryogenic conditions were successful in duplicating the sensor failure. The tests showed that the sensor failed at 57 degrees Fahrenheit, according to KSC spokesman **Bruce Buckingham**. Discovery's main engines have been defoamed; the main engine heatshields have been removed and ORFEUS/SPAS has been serviced with liquid argon. Today, pad workers are conducting post scrub turnaround and securing operations and removing and replacing main engine number 1. Technicians at Launch Complex 39B are scheduled to remove and replace main engines number 2 and 3 at the pad. Launch and landing times remain to be determined. NASA officials have determined that the mission which would carry Russian cosmonaut **Sergei Krikalev** into space has been pushed into 1994. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 18, 1993; Halvorson, FLORIDA TODAY, p. 1A, Aug. 19, 1993.]

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STS 58: VAB OPERATIONS ON HOLD

Operations in the Vehicle Assembly Building are on hold pending a decision to demate the Orbiter from its external tank. Demating and moving the Orbiter to the horizontal position may be required due to certain Spacelab payload changeout considerations. Columbia has been hardmated to its external tank; mechanical mates of the Orbiter to its external tank have also been accomplished. Today, workers are occupied with Orbiter crew module operations. STS 58 work scheduled includes Orbiter/external tank electrical mates and a Shuttle interface test. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 18, 1993.]

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STS 61: HUBBLE RESCUE MISSION PROCESSING

Endeavour remains in Orbiter Processing Facility bay 1 where it continues to be processed for its Hubble Space Telescope repair mission. The launch date of that mission has been made indefinite due to delays in launching STS 51. In OPF bay 1, technicians have completed master events controller/pyrotechnic initiator controller checks; re-opened the payload bay doors; made ammonia boiler checks and orbital maneuvering system functional checks. Work in progress: installation of 5th cryogenic tank set; main propulsion system leak and functional checks; payload integration operations; water spray boiler functional tests; freon coolant loop functional test. Work scheduled: installation of the forward reaction control system on the Orbiter. Work was completed overnight to remove from the mobile

launcher platform in the VAB the left and right hand aft booster segments dedicated for the STS 60 mission. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 18, 1993.]

August 19:

STS 51: FLOODLIGHT REPLACED

Discovery's mid-deck floodlight has been removed and replaced as part of the turnaround operations now underway at Launch Complex 39B. Today workers at the pad are removing and replacing main engine number 1 and conducting orbital maneuvering system regulator flow operations; they are scheduled to remove and replace main engines 2 and 3 at the pad. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 19, 1993.]

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STS 58: ELECTRICAL MATES TO CONTINUE

Operations will resume today to continue electrical mates between Columbia and its STS 58 external tank. A decision was reached yesterday not to destack the Orbiter on the basis that any Spacelab payload changeout considerations can be accomplished at the pad and on orbit if required. Mechanical mates of Columbia to its external tank have been completed. Today, workers are conducting the electrical mates and Orbiter crew module cleaning operations, as well. The mission's Shuttle interface test (SIT) has been scheduled. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 19, 1993.]

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STS 61: HST SERVICING MISSION

Endeavour's payload bay doors have been re-opened; ammonia boiler checks have been made; a freon coolant loop functional test has been completed as have orbital maneuvering system functional checks. Work in progress: fifth cryogenic tank set installation; main propulsion system leak and functional checks; payload integration operations; installation of auxiliary power unit number three; water spray boiler functional test. STS 61 work scheduled: installation of the forward reaction control system on Endeavour; thruster repair operations; servicing the freon coolant loop. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 19, 1993.]

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HUBBLE HARDWARE ARRIVING AT KSC

Flight hardware which will fly aboard the Space Shuttle Endeavour for use on the Hubble Space Telescope (HST) first servicing mission has begun arriving at the Kennedy Space Center. The Wide Field/Planetary Camera II (WFPC II) arrived today at Hangar AE, a NASA Spacecraft Checkout Facility on Cape Canaveral Air Force Station. During the next two weeks 17 trucks will be transferring the flight

hardware for HST servicing and associated support hardware from Goddard Space Flight Center (Greenbelt, MD) to the Kennedy Space Center. The instruments have been in a clean room at Goddard for the last several months undergoing integration and testing. In addition to WFPC II, other primary components arriving over the next two weeks include the Corrective Optics Space Telescope Axial Replacement (COSTAR), two solar panels, the Goddard High Resolution Spectrograph redundancy kit, rate gyro sensor and electronic control units and two magnetometers. The Space Support Equipment (SSE) arrived at KSC by barge August 11 and is now in the Payload Hazardous Servicing Facility being prepared for launch. The units of the SSE include the Orbital Replacement Unit Carrier which is a Spacelab maintenance and repair pallet dedicated to HST activities; the Solar Array Carrier which will hold the replacement solar panels, and the Flight Support Structure which will hold and orient the 43-foot-long, 14-foot diameter HST during its repair by the astronauts. Some of the SSE will house the delicate Hubble corrective optics inside Endeavour's payload bay during the mission. STS 61 is a planned 11-day flight with seven crew members featuring five spacewalks and is entirely dedicated to the servicing of the Hubble Space Telescope. [NASA/KSC News Release No. 103-93, Aug. 19, 1993.]

August 20:

EXTERNAL TANK INSPECTED

Workers at Launch Complex 39B have completed the post-abort inspections of Discovery's STS 51 external tank; they have also removed and replaced main engine #1 and removed main engine #3. Today, technicians will be making mechanical connections of main engine #1, installing main engine #3 and preparing to remove main engine #2. STS 51 work scheduled: mechanical connections of main engine #3; removal of main engine #2 August 21 and replacement August 22. Orbital maneuvering system/reaction control system checks are planned for August 23. [Halvorson, FLORIDA TODAY, p. 2A, Aug. 23, 1993; KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 20, 1993.]

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STS 58/61 PROCESSING STATUS

In the Vehicle Assembly Building high bay 3, technicians have completed Orbiter and external tank closeouts and are continuing Orbiter/ET mating operations for Columbia's STS 58 mission. The Shuttle interface test is scheduled to begin August 23. Meanwhile, in OPF bay 1, workers processing Endeavour for the STS 61 mission have completed orbital maneuvering system functional checks and leak and functional checks of the hydrogen side of the main propulsion system. Work in progress today: fifth cryogenic tank set installation; checkouts of the water spray boilers and payload integration operations. STS 61 work scheduled: master events controller checks and installation of the auxiliary power unit #3.

[KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 20, 1993.]

August 22: HUBBLE REPAIR HARDWARE AT KSC

The first batch of equipment for the Hubble Space Telescope repair mission - scheduled for early December - has arrived at Kennedy Space Center. The equipment includes:

- (a) A special carrier that will serve as a repair pallet.
- (b) Another carrier that will hold new solar panels to be installed on the telescope
- (c) A support structure that will hold and orient the telescope while repairs are made.

The equipment was shipped to KSC after checkout at Goddard Space Flight Center (Greenbelt, MD). It was transported by barge in shipping containers used earlier by the Gamma Ray Observatory and the Long Duration Exposure Facility. On arrival the equipment was taken to the Payload Hazardous Servicing Facility for launch preparations. Telescope replacement components have yet to arrive at the space center; they are expected to arrive later this month. ["Hubble Repair Hardware Arrives," FLORIDA TODAY, p. 10E, Aug. 22, 1993.]

August 23: STS 51: ALL ENGINES REPLACED

At Launch Complex 39B, all of Discovery's main engines have been replaced in preparation for launch in early September. System checks of the Orbiter's rudder speed brake have been made and the multiplexer/demultiplexer unit that failed during a checkout last Friday has been removed. Work in progress: securing of main engine #2; checks of the orbital maneuvering system/reaction control system; installation of a replacement multiplexer/demultiplexer unit and preparations for engine leak checks. STS 51 work scheduled: leak checks of the main engines should begin tonight; a flight readiness test of the main engines is set for August 26 and 27. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 23, 1993.]

II STS 58/STS 61 UPDATES

Orbiter/external tank umbilical closeouts have been completed in preparation for Columbia's STS 58 mission. Today workers are continuing Orbiter/external tank mating operations and are continuing to conduct the Shuttle interface test to its completion today. Workers processing Endeavour for its STS 61 mission have completed checkouts of the water spray boilers and have conducted leak and functional checks of the hydrogen side of the main propulsion system. Currently,

workers are installing the 5th cryogenic tank set and implementing payload integration operations. STS 61 work scheduled includes: master events controller checks and the electrical connection of auxiliary power unit #3. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 23, 1993.]

II

STS 51: LAUNCH ADVISORY

NASA managers today set September 10, 1993, as the new launch date for Shuttle Mission STS 51. The launch window on September 10 opens at 7:38 a.m. EDT. The launch date decision follows the completion of work to remove and replace the three main engines on Discovery. The engine changeout effort was the most efficient way to recover from the launch shutdown which took place on August 12. "The September 10 date is based on successful testing and leak checks of the main engines scheduled for later this week and the assumption of no significant problems arising in the remaining processing flow," said Shuttle Director **Thomas Utsman**. "The entire Shuttle team is doing a super job getting Discovery back into launch configuration." [Halvorson, FLORIDA TODAY, p. 4A, Aug. 21, 1993; LAUNCH ADVISORY: SEPT 10 NEW DATE FOR STS 51 LAUNCH, Aug. 23, 1993; Halvorson, FLORIDA TODAY, p. 4A, Aug. 24, 1993.]

II

MARS OBSERVER MISSION STATUS

Engineers are continuing to attempt to reestablish communication with the Mars Observer Spacecraft, after losing contact with the craft at 6 p.m. PDT on August 21, three days before the spacecraft's capture in orbit around Mars. The spacecraft's on-board sequence to begin preparing for orbit insertion was uplinked on Friday, August 20. Controllers have no reason to believe that the spacecraft is not carrying out those instructions even though communication has been interrupted. The spacecraft is set to enter Martian orbit at approximately 1:30 p.m. August 24. [Halvorson, FLORIDA TODAY, pp. 1A-2A, Aug. 23, 1993; MARS OBSERVER STATUS, Jet Propulsion Laboratory Public Information Office, 8 p.m. PDT, Aug. 22, 1993; "NASA Loses Link to Mars Observer," THE ORLANDO SENTINEL, pp. A1 & A4, Aug. 23, 1993; Halvorson, FLORIDA TODAY, p. 1A-2A, Aug. 24, 1993; Date, THE ORLANDO SENTINEL, pp. A-1 & A-4, Aug. 24, 1993; Halvorson, FLORIDA TODAY, p. 1A, Aug. 25, 1993; Date, THE ORLANDO SENTINEL, pp. A-1 & A-7, Aug. 25, 1993.]

II

NOAA-13 SATELLITE: LOSS OF CONTACT

Satellite controllers lost contact with the NOAA-13 satellite on Saturday, August 21, and preliminary indications are that the spacecraft's power system is not working, officials at NASA and the National Oceanic and Atmospheric Administration said today. Contact has also been lost with the Mars Observer Spacecraft [see above]. All battery charging aboard the satellite ceased at

approximately 3:45 p.m. EDT August 21, said **Charles E. Thienel**, Meteorological Satellites Project Manager at NASA's Goddard Space Flight Center (Greenbelt, MD). Contact with the spacecraft during subsequent ground passes showed steadily decreasing battery voltages and currents, he said. [**NASA/KSC RELEASE: 93-151**; Aug. 23, 1993; "Mars Observer Status Briefing Set for 1 p.m. EDT Today," **EDITORS NOTE: N93-48**, Aug. 24, 1993; Date, **THE ORLANDO SENTINEL**, Aug. 24, 1993.]

II

SPACEPORT WORKERS CONTRACT DISPUTE

Workers at Spaceport USA have filed a protest over their latest contract with the National Labor Relations Board; the workers claim that they had been unfairly represented by their union's business manager. There was no comment today from TW Recreational Services, Inc., the company which runs the Spaceport USA attraction for NASA. [Liden, **FLORIDA TODAY**, p. 20C, Aug. 24, 1993.]

August 24:

STS 51: MISSION UPDATE

NASA managers yesterday selected September 10, 1993, as the new launch date for mission STS 51. The launch window lasts from 7:38 a.m. til 9:42 a.m. EDT. The countdown for mission STS 51 will pickup the morning of September 7 (time to be determined) at the T-43 hour mark. The main engines and multiplexer/demultiplexer (MDM) have been removed and replaced. The power reactant storage and distribution system has been purged. Currently, technicians are installing main engine dome heatshields and conducting main engine securing operations. STS 51 work scheduled: retest of the replacement multiplexer/demultiplexer and a flight readiness test of the three main engines and the aerosurfaces. Current planning calls for a night landing at Kennedy Space Center at 5:42 a.m. September 20. [**KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT**, Aug. 24, 1993; Halvorson, **FLORIDA TODAY**, p.1, Aug. 25, 1993.]

II

STS 58: ELECTRICAL MATES COMPLETED

In preparation for Columbia's STS 58 mission, electrical mates of the Orbiter and its external tank have been completed. Work in progress: Orbiter crew module cleaning operations; Shuttle interface test; Orbiter/external tank umbilical closeouts; leak checks of the main propulsion system; solid rocket booster hydraulic testing. STS 58 work scheduled: rollout to Launch Complex 39B to occur about 4 to 5 days after the launch of Discovery. [**KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT**, Aug. 24, 1993.]

II

STS 61: PAYLOAD INTEGRATION OPERATIONS

In OPF Bay 1, workers have installed Endeavour's auxiliary power unit number 3 and completed payload integration operations. Work in progress: installation of the 5th cryogenic tank set; auxiliary power unit number three leak and functional checks; thruster feedline repair operations; water spray boiler checkout and service; deservicing freon coolant loop number 1; main propulsion system leak and functional checks and the installation of the drag chute. STS 61 work scheduled: installation of the forward reaction control system on Endeavour; star tracker door functional test; Orbiter/external tank umbilical door functional test. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 24, 1993.]

August 25:

STS 51: MDMS REMOVED AND REPLACED

Discovery continues to await launch on its STS 51 mission; liftoff is now set for September 10, 1993. Workers at LC 39B have installed main engine dome heatshields and removed and replaced multiplexer/demultiplexers (MDM). Work in progress: main engine securing operations; main engine and main propulsion system leak checks; retesting of MDMS and hydraulic circulation and sampling. STS 51 work scheduled: flight readiness test of the main engines and their aerosurfaces; replacement of solid rocket booster batteries; spacesuit functional checkout. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 25, 1993.]

II

STS 58: ELECTRICAL MATES COMPLETE

Orbiter/external tank electrical mates for Columbia's STS 58 mission have been completed. Work currently underway for STS 58 in the VAB high bay 3: solid rocket booster hydraulic operations; Orbiter crew module cleaning operations; Shuttle interface test; Orbiter/external tank umbilical closeouts; leak checks of the main propulsion system. STS 58 work scheduled: rollout to Launch Complex 39B to occur four to five days after the launch of STS 51 and a flight control frequency test. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 25, 1993.]

II

APU 3 INSTALLED

Endeavour is being processed in OPF bay 1 for its STS 61 mission, also known as the Hubble Space Telescope repair mission. In the OPF, payload integration operations have been completed as has the installation of the auxiliary power unit number 3. Today, workers are involved in the following activities: 5th cryogenic tank set installation; installation of the drag chute; thruster feedline repair operations; auxiliary power unit number three leak and functional checks;

deservice of freon coolant loop number 1; water pray boiler checkout and service; main propulsion system leak and functional checks. STS 61 scheduled work: Orbiter/external tank umbilical door functional test and the star tracker door functional test. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 25, 1993.]

II

ADVISORY: MARS OBSERVER

JPL's von Karman Auditorium was the sight of today's Mars Observer News Conference. Mars Observer Project Manager **Glenn Cunningham** will discuss the outcome of the spacecraft's onboard 'command lost timer,' which would have clocked out at approximately 2:15 p.m. today and instructed the spacecraft to wait for commands from Earth. Cunningham acknowledged lack of receipt of the communications signal and explained plans for continuing to uplink command sequences to prompt the spacecraft to respond. Cunningham said, "The current situation certainly erodes our prospects considerably. Every day without communications clearly lessens our probability of success." [EDITORS' ADVISORY, Aug. 25, 1993; Halvorson, FLORIDA TODAY, pp. 1A-2A, Aug. 26, 1993.]

II

STS 51: ENGINE TEST LOOMS

Tomorrow the three new main engines of Discovery will be tested; the two-day test cycle will commence today and continue until tomorrow. The goal is to ensure that the engines can be steered properly while in flight. Launch of STS 51 remains slated for September 10. [Halvorson, FLORIDA TODAY, p. 2A, Aug. 26, 1993.]

August 26: STS 51: TEMPERATURE SENSORS INSTALLED

At Launch Complex 39B, technicians have installed liquid oxygen dome temperature sensors; they have also completed main engine securing operations and main engine and propulsion system leak checks. Work in progress: flight readiness test of main engines and aerosurfaces; hydraulic circulation and sampling; spacesuit installation into Orbiter; preparations for helium signature test. STS 51 work scheduled: replace external tank and solid rocket booster batteries; retest multiplexer/demultiplexer (MDM); spacesuit functional checkout; helium signature test and ordnance connections. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 26, 1993; Halvorson, FLORIDA TODAY, Aug. 26, 1993; Halvorson, FLORIDA TODAY, Aug. 27, 1993; Date, THE ORLANDO SENTINEL, Aug. 14, 1993.]

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STS 58: SPACELAB LIFE SCIENCES-2

Columbia continues to remain in the Vehicle Assembly Building's High Bay 3; rollout to LC 39B will occur four to five days after Discovery's STS 51 mission commences. Workers in the VAB have completed their leak checks of Columbia's main propulsion system. Currently, workers' tasks include: Orbiter crew module cleaning operations; Shuttle interface test; solid rocket booster hydraulic operations and Orbiter/external tank umbilical closeouts. A flight control frequency response test has been scheduled. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 26, 1993.]

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STS 61: HST MISSION

Endeavour is being processed for its next mission - STS 61 - in OPF bay 1. Workers have completed the installation of the drag chute and deservicing freon coolant loop number 1. Payload integration operations are finished as is the installation of auxiliary power unit number 3. Work in progress: installation of the 5th cryogenic tank set; thruster feedline installation and mechanical fitting operations; auxiliary power unit number 3 leak and functional checks; freon coolant loop pump package inspections; water spray boiler checkout and service; main propulsion system leak and functional checks; move forward reaction control system to OPF. STS 61 work scheduled: Orbiter/external tank umbilical door functional test; star tracker door functional test; installation of forward reaction control system on Orbiter. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 26, 1993.]

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NOAA-13 INVESTIGATION

A 12-member panel of experts from NASA and NOAA has been named to investigate the failure of the NOAA-13 meteorological satellite, officials at NASA's Goddard Space Flight Center (GSFC), said today. Dr. **Shelby Tilford**, Acting Associate Administrator for the Office of Mission to Planet Earth, NASA Headquarters, and Dr. **Kathryn Sullivan**, Chief Scientist, NOAA, requested Dr. **John M. Klineberg**, Goddard Center Director, to name the investigation board. The board will investigate and to the extent possible, determine the cause of the spacecraft failure and recommend corrective actions which will minimize or preclude the possibility of similar future failures. Klineberg named **Jeremiah Madden**, Associate Director of Flight Projects at Goddard, as board chairman. [NASA/KSC RELEASE NO. 93-154, Aug. 26, 1993.]

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MARS OBSERVER INVESTIGATION BOARD

NASA Administrator **Daniel S. Goldin** today named Dr. **Timothy Coffey**, Director of Research at the Naval Research Laboratory (Washington, D.C.), to head the

review board to investigate the loss of contact with the Mars Observer Spacecraft. Membership of the board will be announced in the very near future. The board will investigate and determine, to the extent possible, the cause of the loss of communications and recommend corrective action to prevent a recurrence in future missions. Communication with the Mars Observer was lost at 6 p.m. PDT on Saturday, August 21, three days before the craft's capture in orbit around Mars. The spacecraft was set to enter orbit around Mars at approximately 1:30 p.m. PDT on Tuesday, August 24. [NASA/KSC RELEASE NO. 93-153, Aug. 26, 1993; Date, THE ORLANDO SENTINEL, pp. A-1 & A-7, Aug. 26, 1993; "NASA Orders Probe of Spacecraft Loss," THE ORLANDO SENTINEL, Aug. 27, 1993; Meyer, FLORIDA TODAY, Aug. 28, 1993; "NASA Chief Appoints Group to Look Into Another Mars Shot," THE ORLANDO SENTINEL, Sept. 1, 1993.]

August 27:

COSTELLO & SONS CONTRACT

Costello & Sons Co. (Merritt Island, FL) has been awarded a \$362,000 contract to renovate the Occupational Health Facility (OHF) in the Industrial Area at Kennedy Space Center. This contract covers work on the east wing of the OHF. The work will involve the removal of asbestos insulation from the ceiling and replacement of the tile, installation of additional plumbing and modification and expansion of some existing rooms. Other work includes revisions to heating and air conditioning ductwork, lighting and the replacement of fire detectors. The work will be performed in three phases to allow the OHF to be fully operational at all times. Costello & Sons will also provide a temporary trailer for office space to accommodate four doctors throughout the contract period. The OHF is one of two medical facilities operated at KSC by Base Operations Contractor EG&G Florida, Inc. [NASA/KSC RELEASE NO. 101-93, Aug. 27, 1993.]

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STS 51: FRT COMPLETED

Technicians at Launch Complex 39B have stowed spacesuits in Discovery's airlock as part of pre-launch preparations for the STS 51 mission. A flight readiness test of the three main engines has also been completed. Work in progress: spacesuit functional checkout; preparations for helium signature test of main engines and main propulsion system; cycling aerosurfaces; retesting multiplexer/demultiplexer (MDM). STS 51 work scheduled: replacement of the external tank and solid rocket booster batteries; helium signature test; ordnance connections; topping off Discovery's auxiliary power units and pressurization of the boosters' hydraulic power units. The launch window for STS 51 on September 10 will be from 7:38 a.m. until 9:42 a.m.; the mission is planned to last for just under 10 days. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 27, 1993; Halvorson, FLORIDA TODAY, p. 4A, Aug. 27, 1993; Halvorson, FLORIDA TODAY, Aug. 28, 1993.]

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STS 61: ENDEAVOUR PROCESSING UPDATE

Endeavour is in the OPF bay 1 where it is being processed for its mission to repair the Hubble Space Telescope. Work currently underway includes: functional testing of the external tank doors; preparations to install the forward reaction control system; 5th cryogenic tank set installation; thruster feedline installation and mechanical fitting operations; auxiliary power unit number three leak and functional checks; freon coolant loop pump package inspections. STS 61 work scheduled: star tracker door functional test; installation of the forward reaction control system on Endeavour. [**KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT**, Aug. 27, 1993.]

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MARS OBSERVER STATUS

The Mars Observer flight team has not been able to reestablish communication with the spacecraft despite repeated efforts to prompt the spacecraft to respond. A command sequence to "reboot" the spacecraft's central computer was sent at 4:30 a.m. PDT on August 27. Commands are sent to the spacecraft assuming it is in orbit around Mars, and to another area of the sky assuming the spacecraft flew by Mars and is now in a heliocentric orbit around the sun. The same commands were reradiated at 1:07 a.m. to the coordinates of the heliocentric orbit. If the command to "cold boot" the spacecraft's central computer system was successful, the spacecraft would enter a safing mode. This mode is more serious than the contingency mode that Mars Observer was switching to during its cruise to Mars. Safe mode is entered in response to a spacecraft hardware anomaly. Flight controllers will wait 65 hours to hear back from the spacecraft. With that option exercised, the team will have utilized all presently understood recovery approaches. They would then begin a "listen only" vigil in the event that the spacecraft's on-board fault protection would be able to restore communication with the ground. [**MARS OBSERVER MISSION STATUS**, Aug. 27, 1993.]

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KSC/FLORIDA SIGN AGREEMENT

Kennedy Space Center Director **Robert L. Crippen** and Governor **Lawton Chiles** recently signed an agreement which will speed the transfer of technology developed in the space program to private industry. Transferring information and technology to the private sector is one of NASA's chartered responsibilities and has greatly benefited the general public and the national economy over the years. Crippen points out the significance of this agreement is that - for the first time - NASA and a state government have set aside money to help develop commercial products using NASA technology. Each party has designated one million dollars spread over the next two years to implement projects under this pact. Under the dual-use partnership, KSC will identify specific NASA technology that has

potential commercial uses. A goal is to share the development costs with an industrial partner in order to achieve the greatest return. The State of Florida, through the Titusville based Technological Research and Development Authority, will identify products and industries that are most likely to benefit from technology and to provide resources and support for promoting the transfer. "This agreement serves as a pipeline that will carry advanced technology developed for our nation's space program into the market place - in the form of innovative, practical products," said Gov. Chiles. "This agreement is believed to be directly on track with our administration's new direction for technology development," said Crippen. "It is in our nation's best interests to return our technological investment to our citizens, and I applaud the State of Florida for assisting industry in sharing this return on our investment." Presentations are planned for the annual Space Congress symposium held in Cocoa Beach. A joint annual report will be made to summarize activities resulting from the intergovernmental cooperative agreement. [NASA/KSC RELEASE NO. 105-93, Aug. 27, 1993; "NASA/Florida Pen Agreement," FLORIDA TODAY, p. 10E, Sept. 12, 1993.]

August 29: ORBITER PAINTING IN LC 39 AREA

A 22-foot image of a Space Shuttle has been painted on the side of a water tower next to the Vehicle Assembly Building by employees of EG&G Florida Inc. "The painting is the result of an employee suggestion to increase morale in the Launch Complex 39 area," said **Larry Sloan** of NASA's Roads, Grounds, and Heavy Equipment Branch. ["Orbiter Painted to Lift Morale," FLORIDA TODAY, p. 10E, Aug. 29, 1993.]

August 30: PREPARATIONS CONTINUE FOR STS 51

Workers at Kennedy Space Center's Launch Complex 39 will conduct a check of Discovery's thruster system that steers the Shuttle in orbit, according to KSC spokesman **Bruce Buckingham**. The Orbiter's three main engines have already been replaced at the pad. NASA had planned to move Discovery off the launch pad if Hurricane Emily threatened to make landfall in the Brevard County area; those plans were aborted when Emily moved away from the county and headed north. [Reitz, FLORIDA TODAY, p. 2A, Aug. 30, 1993.]

I] CAPE ROCKET LAUNCHES THIS WEEK

The Air Force will launch a Delta 2 rocket today between 8:38 a.m. to 9:04 a.m.; the rocket will launch a Navstar Global Positioning System satellite. On September 3, a General Dynamics Commercial Atlas rocket will launch carrying a Hughes Communications Inc. communications satellite. The launch window for the General Dynamics launch is between 6:59 a.m. and 8:19 a.m. [Halvorson, FLORIDA TODAY, p. 2A, Aug. 30, 1993.]

II

STS 51: SPACESUITS INSTALLED

Discovery continues to undergo preparations for its September 10 STS 51 mission. Completed tasks include: flight readiness test of main engines and aerosurfaces; hydraulic circulation and sampling; retest multiplexer/demultiplexer (MDM); spacesuit installation into Orbiter and functional checkout; replacement of external tank and solid rocket booster batteries; helium signature test. Work in progress: X-ray main engine hydraulic quick disconnects; open payload bay doors; crew module hatch functional checks; orbital maneuvering system helium tank pressurization. STS 51 work scheduled: ordnance connections; launch countdown preparations; aft engine compartment closeouts. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 30, 1993; Reitz, FLORIDA TODAY, Aug. 30, 1993.]

II

STS 58: SHUTTLE INTERFACE TEST

Columbia's Shuttle interface test has been completed. Workers in the Vehicle Assembly Building's high bay 3 have also completed Orbiter/external tank umbilical operations and solid rocket booster hydraulic operations. Today, workers are conducting Orbiter crew module cleaning operations. A flight control frequency response test will be conducted tomorrow, August 31. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 30, 1993.]

II

STS 61: FRCS INSTALLED

In OPF bay 1, Endeavour's forward reaction control system has been installed. Other tasks completed in the course of the Orbiter's STS 61 processing include: auxiliary power unit number three leak and functional checks; freon coolant loop pump package inspection; water spray boiler checkout and service; main propulsion system leak and functional checks; move forward reaction control system to OPF; installation of the fifth cryogenic tank set. Work in progress: fifth cryogenic tank set leak checks; thruster feedline mechanical fitting checks; ammonia boiler checks; freon coolant loop operations; Orbiter vent door functional checks; forward reaction control system electrical connections and interface verifications. STS 61 work scheduled: Orbiter/external tank umbilical door functional test; star tracker door functional test. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Aug. 30, 1993.]

II

DELTA 2 LAUNCH SUCCESSFUL

The Air Force successfully launched its Delta 2 this morning at 8:38 a.m.; the launch was the 44th consecutive launch success for the McDonnell Douglas Space Systems Co. (Huntington Beach, CA). The Delta carried the 25th Global Positioning System satellite into orbit. According to Air Force spokeswoman Terri

Bracher, the GPS system can pinpoint the location of military ships, planes and ground troops to within 50 feet anywhere in the world and was used widely during the War in the Persian Gulf. [Thompson, FLORIDA TODAY, p. 1A, Aug. 31, 1993.]

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ENDEAVOUR MUST FLY BY DEC. 10

"We will not slide the launch [of Endeavour] into the Christmas and New Year's time frame," said NASA mission director **Randy Brinkley**. NASA officials said today that unless Endeavour flies its Hubble Space Telescope repair mission by December 10, the mission would be delayed until 1994. "And based on the last six months," Brinkley said, "I'm sure you recognize there is a distinct possibility that we may in fact have to delay the launch...." [Halvorson, FLORIDA TODAY, pp. 1A-2A, Aug. 31, 1993.]

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ACTS CHECKED BEFORE LAUNCH

"We don't expect there to be any problem. This [the checking] is something routinely done to see if there is any commonality" with the Advanced Communications Technology Satellite and the lost Mars Observer spacecraft, according to KSC spokesman **George Diller**. A possible cause of the Mars Observer failure is the presence of a bad transistor like those found on the NOAA-13 satellite which was lost the same day as the Mars Observer. [Tamman, FLORIDA TODAY, p. 2A, Aug. 31, 1993; Banke, FLORIDA TODAY, Sept. 1, 1993.]

August 31:

MARS OBSERVER STATUS

The Mars Observer flight team is meeting today to discuss the possible ramifications of attempting another command sequence to switch the "redundant crystal oscillator" -- the "quartz crystal" of the spacecraft's internal clock, from the backup to the primary unit. No commanding will occur today. The earliest time that the team would begin another command sequence would be late afternoon on Wednesday, September 1. A decision to try to "cold boot" the spacecraft's backup computer system was also deferred yesterday. Analysis by flight team groups indicated greater potential risk to other spacecraft subsystem elements in doing so than was deemed necessary. [MARS OBSERVER MISSION STATUS, Aug. 31, 1993.]

SEPTEMBER

September 1:

TOS HEALTH CHECK

At Launch Complex 39B, workers have completed a state-of-health check on the Transfer Orbit Stage (TOS) in the payload bay of Discovery. Pad technicians preparing the Orbiter for next week's STS 51 launch also completed a checkout of the solid rocket booster hydraulic system. Work in progress on STS 51: ordnance connections; application of foam insulation to Orbiter engine interface lines; installation of aft skirt thermal curtains; installation of main engine heat shield carrier panels and countdown preparations in Firing Room 1. STS 51 work scheduled: external tank purges; start of aft closeouts; Advanced Communications Technology Satellite (ACTS) functional test; ORFEUS argon servicing. [STS 51 SPACE SHUTTLE STATUS REPORT, Sept. 1, 1993; Banke, FLORIDA TODAY, Sept. 2, 1993.]

II

MARS OBSERVER MISSION STATUS

The Mars Observer flight team is meeting again today to discuss various commands that might be viable options in the next few days. No commanding will occur today. The command sequence to switch the "redundant crystal oscillator" - the "quartz crystal" of the spacecraft's lateral clock - from the backup to the primary unit was under consideration today. A sequence to attempt to "cold boot" the spacecraft's backup computer system was also under consideration. [MARS OBSERVER MISSION STATUS, Sept. 1, 1993.]

II

GOLDIN ANNOUNCED NEW MARS OBJECTIVE

NASA Administrator Daniel S. Goldin today announced the establishment of a study team at NASA's Jet Propulsion Laboratory (Pasadena, CA), to explore possibilities for a return mission to Mars to recover some of the scientific objectives of the Mars Observer mission, if communications with that spacecraft cannot be reestablished. The study team, led by Dr. Charles Elachi (Assistant Laboratory Director at JPL) will look at a variety of low-cost spacecraft, instrument and launch options, with the objective of returning to Mars in 1994 or 1996. The team will review spacecraft and instrument options from industry and government, including Mars Observer spares and possibly international contributions. The team is expected to present potential mission options to NASA within the next two months. [NASA/KSC RELEASE: 93-157, Sept. 1, 1993; "NASA May Send New Mars Probe," FLORIDA TODAY, p. 2A, Sept. 3, 1993.]

II

COLUMBIA/ENDEAVOUR STATUS

In the Vehicle Assembly Building, a frequency response test of the Orbiter's flight controls was rescheduled from yesterday to today. The test was postponed after a leak developed in a hydraulic fluid supply line on ground support equipment. In OPF bay 1, technicians are installing auxiliary power unit No. 2 in Endeavour's aft compartment and flood lights inside the payload bay. [STS 51 SPACE SHUTTLE STATUS REPORT, Sept. 1, 1993.]

September 2:

STS 51: ORDNANCE CONNECTIONS

Ordnance connections have been made at Launch Complex 39B where preparations continue for Discovery's launch on the STS 51 mission. Solid rocket booster aft skirt thermal curtains have been installed as have been the main engine heat shields and carrier panels. Work in progress: main engine compartment closeouts; avionics bay closeouts; application of foam insulation to #3 engine interface lines; external tank purge; countdown preparations in Firing Room 1 for 8:00 a.m. September 7 start. [STS 51 SPACE SHUTTLE STATUS REPORT, Sept. 2, 1993.]

II

STS 58/61 STATUS REPORT

In the Vehicle Assembly Building, the frequency response test of the Orbiter's flight controls continues. Columbia's STS 58 mission is now targeted for early October. Endeavour continues to undergo processing activities in OPF bay 1. In the bay, verification testing of the forward reaction control system continues, the air data probe is being aligned in preparation for a deployment test, and leak checks to the PRSD cryogenic reactant system are in work. Installation of the Global Positioning Satellite (GPS) receiver is complete. At Pad 39A, tanker trucks have been delivering liquid oxygen to refill the storage tanks for Endeavour's December launch. [STS 51 SPACE SHUTTLE STATUS REPORT, Sept. 2, 1993.]

II

U.S./RUSSIAN SPACE PACT

Vice President **Al Gore**, decreeing a virtual end to the space race of thirty years ago, today announced a major space agreement with Russia. The two nations agreed to collaborate to build an international space station that would cut costs and speed up construction of the station. Gore said the pact will produce a space station that "will be significantly better than any of the options that we could orbit on our own. There is a natural fit between important components of the Russian program and the American program that allow our cooperative work to produce a superior station at lower costs." The astronaut/cosmonaut exchange program will also be expanded. Russian Prime Minister **Victor Chernomyrdin** said, "It is

time to leave behind the vestiges of the Cold War and reach for a new partnership between the United States and Russia." [Halvorson, FLORIDA TODAY, pp. 1A-2A, Sept. 3, 1993; Halvorson, FLORIDA TODAY, p. 1A, Sept. 3, 1993; Banke, FLORIDA TODAY, pp. 1A-2A, Sept. 4, 1993; "U.S., Russia Agree to Cooperate In Energy Development, Space," THE ORLANDO SENTINEL, p. A-6, Sept. 3, 1993.]

September 3: GENERAL DYNAMICS ATLAS LAUNCH

Today, General Dynamics will launch its Atlas rocket carrying another Navy communications satellite; earlier in the year a launch of the same sort and identical payload failed. The Navy's project director, Capt. **John Long** said, "We're very satisfied with the work General Dynamics has done in preparing this launch vehicle following our failure." [Banke, FLORIDA TODAY, p. 2A, Sept. 3, 1993; Banke, FLORIDA TODAY, p. 1B, Sept. 4, 1993; Date, THE ORLANDO SENTINEL, p. A-7, Sept. 3, 1993; Date, THE ORLANDO SENTINEL, Sept. 4, 1993.]

[] TECHNOLOGY/EDUCATION INITIATIVES

Today NASA Administrator **Daniel S. Goldin**, U. S. Senator **Robert C. Byrd** and U. S. Representative **Alan B. Mollohan** participated in a ceremonial groundbreaking for two NASA projects with national potential at the Wheeling Jesuit College (Wheeling, West Virginia). The two programs are the Classroom of the Future and the National Technology Transfer Center (NTTC). The Classroom of the Future is a leading-edge, educational technology initiative to improve the quality of science, mathematics and technology education. It is a "laboratory" to develop stimulating, interactive multimedia curriculum materials and model pre-service and in-service teacher education programs.

The National Technology Transfer Center (NTTC) operates a national gateway service that assists U.S. firms in rapidly locating federal laboratory technology and provides the associated technology transfer assistance. The NTTC gateway service, which began in October 1992, currently handles between 200 to 300 technological inquiries from industry every month. Other key NTTC activities include technology transfer training and education services, outreach to industry to promote federal technology transfer and initiatives to stimulate private/public technology partnerships with federal labs and to further develop the national network. [NASA/KSC RELEASE: 93-158, Sept. 3, 1993.]

[] MARS OBSERVER BOARD NAMED

Dr. **Timothy Coffey**, Chairman of the Mars Observer Investigation Board, today recommended the remaining board members for approval by NASA Administrator

Daniel S. Goldin. In accepting the recommendations, Goldin said, "I have full confidence that the board will do its utmost in providing a thorough and systematic review to determine the cause for the loss of communications with Mars Observer." Dr. Coffey, who is Director of Research at the Naval Research Laboratory (NRL, Washington, D.C.) said, "The members were selected based on their significant experience in the development, acquisition and operation of space systems."

The board will investigate and determine, to the extent possible, the cause of the loss of communications and recommend corrective actions to prevent a recurrence in future missions. The board plans to present its findings to the NASA Administrator in late November. A final report will be released and made public after final acceptance by the NASA Administrator. The board includes: **Thomas C. Betterton**, Rear Admiral, United States Navy; **Peter G. Wilhelm**, Director of Naval Center for Space Technology, NRL; **Dr. Michael D. Griffin**, Chief Engineer, NASA; **Dr. Joseph Janni**, Chief Scientist, Air Force Philips Laboratory; **Dr. Kathryn D. Sullivan**, Chief Scientist, National Oceanic and Atmospheric Administration. Communication with the Mars Observer was lost at 6 p.m. PDT on Saturday, August 21; the spacecraft was set to enter Mars orbit at approximately 1:30 p.m. PDT on Tuesday, August 24. [NASA/KSC RELEASE: 93-159, Sept. 3, 1993.]

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STS 51: PRE-LAUNCH STATUS

At Launch Complex 39B, technicians have completed ordnance connections on Discovery for its September 12 STS 51 mission. In addition, external tank purges and main engine foaming operations have been completed. Work in progress: Orbiter aft engine compartment closeouts; launch countdown preparations; ACTS functional test and battery charging; ORFEUS gaseous argon servicing. STS 51 work scheduled: start of countdown at 8 a.m.; aft confidence test; ACTS health checks; close payload bay doors for flight. [Banke, KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 3, 1993; Banke, FLORIDA TODAY, p. 1A, Sept. 4, 1993.]

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STS 58/61 UPDATES

Columbia's STS 58 mission to deploy Spacelab Life Sciences-2 is scheduled for sometime in early October and last for two weeks. The flight control frequency response test has been completed and hydraulic circulation and sampling operations are underway. Work to X-ray the auxiliary power units is scheduled. Meanwhile, processing operations for Endeavour's STS 61 mission have continued as well. The mission is targeted for early December and is designed to service and repair the Hubble Space Telescope. Completed tasks include: flood light installation; thruster feedline mechanical fitting checks; Orbiter/external tank

umbilical door functional test; star tracker door functional test; ammonia boiler checks; Orbiter vent door functional checks; forward reaction control system electrical connections, interface verifications and trickle purge initiation and window number 5 installation. Work in progress for STS 61: cryogenic tank set pressurization and leak checks; freon coolant loop deservice operations; auxiliary power unit installation and tests. Crew module leak tests are scheduled. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 3, 1993.]

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KOHR'S RETIRING

Richard H. Kohrs, Director, Space Station Freedom, is retiring from NASA today after 30 years of service to the space agency in Houston and in Washington, D.C. "Mr. Kohrs has made many significant contributions to NASA and to the Apollo, Space Shuttle and Space Station programs over the last 3 decades," said **Arnold Aldrich**, NASA's Associate Administrator for Space Systems Development. "His outstanding program management abilities are unique in the agency. His talents will be sorely missed. For Space Station Freedom, Dick built a strong and effective program organization which stood the test despite continuing cycles of reassessment and restructure. With each review, the Space Station became a stronger and more effectively focused program. He has been an immensely respected leader for Space Station Freedom within NASA, our international partners, the program contractors, on Capitol Hill and in the Executive Branch." [NASA/KSC RELEASE: 93-160, Sept. 3, 1993; "Freedom Designer Kohrs Resigns," FLORIDA TODAY, p. 2A, Sept. 4, 1993; "Space Station Chief Retires As Project Faces Overhaul," THE ORLANDO SENTINEL, Sept. 4, 1993.]

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DISCOVERY GETS NEW SOFTWARE

NASA has installed new launch software in Discovery in order to circumvent another last minute main-engine shutdown. It would allow Discovery to liftoff even if the same engine problem which occurred last month occurred again. The software change was just one of many updates. The new software was tested before it was installed just before Discovery's fourth launch attempt. [Date, THE ORLANDO SENTINEL, p. A-1 & A-8, Sept. 4, 1993.]

September 7:

STS 51 LAUNCH RESCHEDULED

Late Friday evening (September 3) mission managers rescheduled the launch of STS 51 for Sunday (September 12) to allow engineers and managers additional time to complete a review concerning the ACTS payload. Specifically, the ACTS Independent Review Team is reexamining the spacecraft's design, production and testing heritage while verifying the readiness of the spacecraft for launch. STS

51 tasks which have now been completed include: Orbiter aft engine compartment closeouts; ACTS functional test and health checks and ORFEUS gaseous argon servicing. Work in progress: launch countdown preparations; aft confidence tests; payload vertical closeouts; ACTS battery charging. STS 51 work scheduled: start of the countdown at 8 a.m. September 9 at T-43 hours; closing of the payload doors for flight. [Banke, FLORIDA TODAY, p. 4A, Sept. 1, 1993; Banke, FLORIDA TODAY, p. 6A, Sept. 2, 1993; Banke, FLORIDA TODAY, p. 1A, Sept. 5, 1993; KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 7, 1993; Minis, FLORIDA TODAY, p. 4A, Sept. 8, 1993; "Shuttle Work Will Resume After Holiday," FLORIDA TODAY, Sept. 6, 1993; Date, THE ORLANDO SENTINEL, Sept. 9, 1993.]

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STS 58: APU'S X-RAYED

The Space Shuttle Orbiter Columbia is in the Vehicle Assembly Building's high bay 3 for processing prior to its rollout for the STS 58 mission. The Orbiter's auxiliary power units have been X-rayed. Today technicians are conducting hydraulic leak checks and circulation and sampling operations. Rollout will follow Discovery's STS 51 launch on Sunday, September 12. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 7, 1993.]

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STS 61 PROCESSING UPDATE

In OPF bay 1, technicians have completed freon coolant loop deservice operations in preparation for Endeavour's STS 61 mission in December. Work in progress: cryogenic tank set pressurization and leak checks; auxiliary power unit installation and tests; orbiter aft closeout operations; stacking of solid rocket boosters in the Vehicle Assembly Building's high bay 1. Crew module leak tests are scheduled. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 7, 1993.]

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ONEIDA CONSTRUCTION CONTRACT AWARD

Oneida Construction Co. (Mims, FL) has been awarded a \$180,548 contract to construct a contract bid information center at the Gate 2 Pass and Identification Building at Kennedy Space Center. Officially, the facility will be known as KSC's Central Industry Assistance Office and will be regularly staffed with NASA procurement employees. The center will be housed in a 1,950-square-foot addition to the present structure on State Route 3 at KSC's southern boundary. The small business firm will have until January 15, 1994, to complete construction and installation of equipment to upgrade the structure's existing heating, ventilation and air conditioning system.

Members of the public will be able to review all NASA contract bid openings at the new center without having to enter KSC. Previously, potential bidders had to obtain a temporary badge to gain access to the Headquarters Building in order to review contract solicitations. Federal regulations prohibit unbadged or unescorted access to KSC. Representatives of the prime Kennedy Space Center contractor companies will also be use the center to provide information on bidding for their subcontracts. NASA procurement officials hope the center will help the general public receive information in a more timely fashion to meet bid submission deadlines. [KSC Release No. 107-93, Sept. 7, 1993; "Bid Info Center Springs to Life," FLORIDA TODAY, p. 10E, Sept. 12, 1993.]

September 9: STS 51 COUNTDOWN STARTS ON SCHEDULE

The countdown for launch of the Space Shuttle Discovery on its STS 51 mission began as scheduled today at 8 a.m. EDT, at the T-43 hour mark. This marks the beginning of the fourth launch attempt of the Orbiter Discovery since launch was scrubbed on July 17 and 24 due to technical problems and again, most recently, on August 12. Additionally, launch was postponed from August 4 until August 12 due to concerns regarding the Perseid meteor shower and from September 10 to 12 due to concerns with the Advanced Technology Satellite (ACTS) payload. The countdown includes 28 hours and 45 minutes of built-in hold time leading to the opening of the launch window at 7:45 a.m. (EDT) September 12. The 1 hour, 55 minute window extends until 9:40 a.m.

A primary objective of this mission is the deployment of the ACTS and its Transfer Orbit Stage (TOS). ACTS/TOS is the latest in NASA's series of advanced communications satellites and a test-bed for technology which will be used in future operational satellites. Also, the Orbiting Retrievable Far and Extreme Ultraviolet Spectrometer-Shuttle Pallet Satellite (ORFEUS-SPAS) payload will be deployed and retrieved during this mission. Also on board is the Commercial Protein Crystal Growth (CPCG) experiment, the Chromosome and Plant Cell Division in Space (CHROMEX) experiment, and the IMAX camera. In addition, astronauts **Jim Newman** and **Carl Walz** are scheduled to perform a six-hour spacewalk on the fifth day of the mission as a continuation of a series of test spacewalks to increase experience and refine training methods. They will work with several tools that may be used during the servicing of the Hubble Space Telescope mission later this year. Today in Firing Room 1 of the Launch Control Center, the KSC launch team is verifying systems to assure that the Shuttle is powered up and that the data processing and backup flight control systems are operating trouble free. [KSC Release No. 112-93, Sept. 9, 1993.]

II

STS 51: COUNTDOWN STARTS

The countdown for Discovery's launch began today at 8 a.m. at the T-43 hour mark. Forecasters indicate a 30 percent probability of weather prohibiting launch with the primary concerns being a chance of showers and possible cloud ceilings below 8,000 feet. The five member crew for this mission are scheduled to arrive at KSC at about 1 p.m. today. Crew members are Commander **Frank Culbertson**, Pilot **William Readdy**, and Mission Specialists **Jim Newman**, **Dan Bursch** and **Carl Walz**. STS 51 work completed include: Advanced Communications Technology Satellite (ACTS) battery charging; crew equipment closeouts; launch preparations.

Mission processing work today: verification of Shuttle power on systems, data processing and flight control systems; stowage of mid-deck and flight deck supplies and payloads; preparations for power reactant and storage distribution system operations; Orbiter and payload bay closeouts; retraction of payload ground handling mechanism; closing of payload bay doors; crew arrival; repressurization of orbital maneuvering system with gaseous nitrogen. STS 51 work scheduled: loading cryogenic reactants into the onboard power reactant storage and distribution system tanks; retraction of the rotating service structure; external tank loading operations. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 9, 1993.]

II

STS 51 CREW ARRIVAL

The five member crew of Discovery's STS 51 mission arrived today at Kennedy Space Center's Shuttle Landing Facility; the time was 1:36 p.m. The crew met reporters at the SLF in what is a Shuttle tradition. As reported in FLORIDA TODAY, "It's one for the money," Discovery Commander **Frank Culbertson** sang out..." "Two for the show," said Pilot **Bill Readdy**. "Three to get ready," piped in Mission Specialist **Jim Newman**. "And four is to GO!" astronaut **Daniel Bursch** shouted, stabbing a fist in the air. NASA Test Director **Bill Dowdell** commented in a more sober tone, "We've said all along that we will launch when we're ready." [Halvorson, FLORIDA TODAY, p. 1A, Sept. 10, 1993.]

September 10:

LAUNCH MINUS 2 DAYS

The countdown for Discovery's STS 51 launch continues today without problem. The pad will be closed for most of today for the loading of the onboard cryogenic tanks with the liquid hydrogen and liquid oxygen reactants. These reactants provide electricity to the Orbiter while in space and drinking water for the crew. The pad was closed to all personnel at about 8 a.m. Cryogenic flow began about 10 a.m. and will last for about 5 hours. Following this operation the Orbiter mid-body umbilical unit will be demated, Orbiter communications activation will start and final vehicle and facility closeouts will begin. Tomorrow, preparations will

be made to retract the rotating service structure to launch position at about 11 a.m. Tanking is scheduled to begin at about 11:25 p.m. Saturday (September 11). The payload bay doors were closed yesterday at 3:30 p.m. following the completion of all payload bay operations.

Two mid-deck experiments will be installed into the Orbiter tomorrow. The Commercial Protein Crystal Growth (CPCG) experiment will be installed at 7:45 a.m. and the Chromosome and Plant Cell Division in Space (CHROMEX) experiment will be installed beginning at about 4:30 p.m. Forecasters indicate a 20 percent probability of weather prohibiting launch with the primary concerns being possible showers and a low cloud ceiling. The winds at the pad are expected to be from the northeast at 5 to 7 knots; temperature 74-80 degrees F.; visibility 7 miles; and clouds scattered at 2,500 and 25,000 feet. The 24-hour and 48-hour delay forecasts reveal an increasing threat of showers and isolated storms at KSC during the launch window and list a 40 percent chance of violation each day. The five-member astronaut crew for this mission arrived at KSC's Shuttle Landing Facility yesterday at about 1:30 p.m. Today they will be involved with checking out their mission plans and fit checks of their equipment. They are scheduled for some free time this afternoon and will be ready for sleep at about 5 p.m. They will be awakened tomorrow at about 2:30 a.m. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 10, 1993; Date, THE ORLANDO SENTINEL, Sept. 11, 1993.]

II

BOC EXTENDED THROUGH OCTOBER

NASA announced today that the Kennedy Space Center Base Operations Contract (BOC) currently held by EG&G Florida, Inc., has been extended for one additional month. Exercising one of three, one-month, options to the existing contract, this action covers the period from October 1 to October 31, 1993, and is valued at \$14,168,019. One of three major contracts at KSC, the BOC provides a wide variety of services to the center including management, operations, maintenance and engineering for KSC facilities and utilities, technical and administrative operations, health, fire and security services. EG&G Florida has held the Base Operations Contract for the past 10 years and is one of four companies involved in a re-competition. [KSC Release No. 113-93, Sept. 10, 1993.]

II

CORDOVA NAMED NASA CHIEF SCIENTIST

NASA Administrator **Daniel S. Goldin** announced today that Dr. France Anne Cordova, head of the Astronomy and Astrophysics Department at Pennsylvania State University, will assume the responsibilities of NASA Chief Scientist effective mid-October. She will be on extended detail from the University to NASA. In this position, Cordova will be the Administrator's senior scientific advisor. Also, she will be the principal interface between the Administrator and

the national and international science community to ensure that NASA programs are universally regarded as scientifically and technologically well founded and are appropriate for their intended applications. One of her critical duties will be to coordinate an integrated strategic plan for all the scientific disciplines across NASA. "NASA and the whole scientific community are indeed fortunate that Dr. Cordova has agreed to assume this most important position. She brings to the agency a wealth of professional experience and service," Goldin said. [NASA/KSC RELEASE: 93-162, Sept. 10, 1993.]

September 11:

LAUNCH MINUS 1 DAY

The countdown for Discovery's STS 51 launch continues without problem today. Yesterday work to load cryogenic fuels into the Orbiter storage tanks was completed on time and the pad was reopened for the regularly scheduled operations. Following fueling operations the Orbiter mid-body umbilical unit was demated from the vehicle. Orbiter communications activation and final vehicle and facility closeouts are continuing today. This morning, preparations are being made to retract the rotating service structure to launch position. First motion remains set for about 11 a.m. At about 11:25 p.m. tonight, operations will begin to load the external tank with more than 500,000 gallons of liquid hydrogen and liquid oxygen. Operations toward that milestone are proceeding without problem.

Two mid-deck experiments are on the schedule for installation into the Orbiter today. The Commercial Protein Crystal Growth (CPCG) experiment was installed at 7:45 a.m. and the Chromosome and Plant Cell Division in Space (CHROMEX) experiment will be installed beginning at about 4:30 p.m. Forecasters indicate a 30 percent probability of weather prohibiting launch tomorrow with the primary concerns being possible showers and thunderstorms and a low cloud ceiling. The winds at the pad are expected to be from the northeast at 5 to 7 knots; temperature 74-80 degrees F; visibility 7 miles; and clouds scattered at 2,500 and 10,000 feet and broken at 25,000 feet. The 24-hour and 48-hour delay forecast reveal an increasing threat of showers and isolated storms at KSC during the launch window and list a 30 percent chance of violation each day.

Today, the five-member astronaut crew for this mission have been given a briefing on tomorrow's weather outlook and completed their review of launch day activities and mission plans. All STS 51 crew members flew in the T-38 training aircraft this morning. The crew will be granted several hours of free time this afternoon and be ready for sleep at about 5 p.m. They will be awakened tomorrow at 2:50 a.m. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 11, 1993; Halvorson, FLORIDA TODAY, pp. 1A-2A, Sept. 11, 1993; Halvorson, FLORIDA TODAY, pp. 1A & 6A, Sept. 12, 1993.]

September 12:

STS 51 LAUNCH SUCCESS

Everything worked perfectly this morning for Discovery; launch was right on time at 7:45 a.m. EDT. Seven minutes after launch, however, a temperature sensor on one of Discovery's main engines failed; a backup sensor came to the rescue. **Loren Shriver**, former astronaut and Chairman of NASA's Mission Management Team, said, "We're going to have to get more data on the sensor and some analysis as to what caused it to go shoot off the scale." Launch Director **Robert B. Sieck** spoke of the tense moments before launch, "As we went into the terminal count, I think you could have heard a pin drop in the Launch Control Center." Shriver added, "When you come through three countdowns like we did and have two of them end very close in, there's a lot of work, a certain amount of letdown when you have to come back and try it again. I think everybody was just kind of extra alert and kind of sitting on the edge of the chair." [Halvorson, FLORIDA TODAY, pp. 1A-2A, Sept. 13, 1993.]

[]

FOSTER WINS SILVER SNOOPY

USBI's **Judith Foster** was recently awarded a Silver Snoopy by astronaut **Charles Precourt** for making significant contributions to the manned space program. Foster has been employed as a senior quality assurance technician for 14 years by USBI. She was specifically recognized for identifying a problem with a fuse on some ordnance by going beyond the normal inspection requirements. ["Foster Wins Silver Snoopy," FLORIDA TODAY, p. 9E, Sept. 12, 1993.]

[]

COLUMBIA'S PROBLEMS MAY CAUSE DELAY

Technical problems inside the Space Shuttle Columbia may cause its STS 58 mission launch to be delayed a week. Two of the Orbiter's auxiliary power units are suspect and must be replaced so that NASA will have to push beyond the target date of October 7 and assign a new, later, liftoff date. "We're still laying the schedule out," according to Kennedy Space Center Launch Director **Robert B. Sieck**. "It will probably be somewhere around the 10th to the 15th, somewhere within the second week of October." [Banke, FLORIDA TODAY, p. 4A, Sept. 13, 1993.]

September 13:

LITTLE PAD DAMAGE

KSC managers are reporting very minimal damage to Launch Complex 39B following yesterday's successful launch of Discovery at 7:45 a.m. EDT. The twin solid rocket boosters are due into the port early this afternoon. STS 51 is expected to conclude with a Kennedy Space Center landing on September 22 at

4:04 a.m. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 13, 1993.]

[] STS 58: SPACELAB LIFE SCIENCES-2

In the VAB, work has been completed on Columbia's external tank cavity purge. Today, technicians will be conducting cavity purge checks and making external tank/solid rocket booster pre-rollout preparations. Rollout of Columbia to Launch Complex 39B is set for September 16 at 4:00 a.m. The mission's terminal countdown demonstration test is set for early next week followed by the launch readiness review. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 13, 1993; "Columbia Heads for Launch Pad," FLORIDA TODAY, p. 10E, Sept. 12, 1993.]

[] STS 61: PRE-LAUNCH TESTING CONTINUES

In OPF bay 1, technicians continue to ready Endeavour for rollover to the Vehicle Assembly Building. Completed tasks include: replacement of payload bay flood lights; ammonia boiler installation and pallet checks; crew module hatch and functional tests. Work in progress: cryogenic tank set pressurization and leak checks; freon coolant loop pump package installation and operational checks; Orbiter aft closeout operations; stacking of solid rocket boosters in Vehicle Assembly Building high bay 1. STS 61 work scheduled: installation of window number 5 and auxiliary power unit number 1. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 13, 1993.]

September 14: STS 51 UPDATE

Discovery's twin solid rocket boosters arrived at Hanger AF at Cape Canaveral Air Force Station yesterday in the early afternoon. Disassembly and flight assessments are in work today. The mobile launcher platform will be removed from Launch Complex 39B tomorrow morning. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 14, 1993.]

[] STS 58: ROLLOUT SCHEDULED

Columbia will be rolled out to Launch Complex 39B on September 16 at 4 a.m. Technicians in the Vehicle Assembly Building have completed an Orbiter/external tank cavity purge. Today, they are conducting LC 39B pad validations; pre-rollout inspections; retracting service platforms and preparing to remove auxiliary power units 1 and 3. Both the terminal countdown demonstration test (TCDT) and the launch readiness review (LRR) will be implemented early next week. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 14, 1993.]

II

STS 61: FLOODLIGHT REPLACED

Preparations for Endeavour's STS 61 mission continued in OPF bay 1. Technicians have replaced the mid-port floodlight in the Orbiter's payload bay. In addition, ammonia boiler installation and pallet checks and crew module hatch and functional tests have been completed. Work in progress today: cryogenic tank set pressurization and leak checks; main propulsion leak and functional tests; freon coolant loop pump operational checks; installation of auxiliary power unit number 1; ammonia boiler servicing operations; installation of window number 5; Orbiter aft closeout operations; stacking of the solid rocket boosters in the Vehicle Assembly Building's high bay 1. Payload bay door functional checks and orbital maneuvering system electrical circuit verifications are scheduled. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 14, 1993.]

September 15:

STS 58: PRE-ROLLOUT INSPECTIONS

Pre-rollout inspections for Columbia have been completed; rollout to Launch Complex 39B is scheduled to occur tomorrow at 4:00 a.m. Preparations to remove auxiliary power units 1 and 3 have been completed as part of the pre-launch processing for Columbia's STS 58 mission. The mission is expected to commence in mid-October. Today workers are completing Pad 39B validations and are implementing rollout preparations and the retraction of service platforms. STS 58 work scheduled includes rollout tomorrow and TCDT and LRR tests early next week. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 15, 1993.]

II

STS 61: EARLY DECEMBER LAUNCH

Endeavour's freon coolant pump package has been installed during the Orbiter's stay in OPF bay 1. Work in progress: cryogenic tank set pressurization and leak checks; main propulsion leak and functional checks; install auxiliary power unit number 1; freon coolant loop operational checks; install auxiliary power unit number 1; ammonia boiler servicing operations; install window number 5; Orbiter aft closeout operations; stacking of solid rocket boosters in Vehicle Assembly Building high bay 1. STS 61 work scheduled: payload bay door functional checks; Orbital maneuvering system electrical circuit verifications. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 15, 1993.]

September 16:

STS 58: ROLLOUT DELAYED

Rollout of Columbia to Launch Complex 39B for its upcoming STS 58 mission has been delayed until midnight tonight due to inclement weather forecasts throughout the day. Rollout preparations had been completed and the service platforms had been retracted. Pre-rollout inspections had been conducted. LC

39B pad validations were implemented today. STS 58 tasks scheduled: the rollout and the terminal countdown demonstration test is set for early next week. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 16, 1993.]

II

STS 61: COOLANT LOOP SERVICED

Technicians in the Orbiter Processing Facility have completed Endeavour's coolant loop servicing and operational checks. Work in progress today: install inertial measurement unit; cryogenic tank set pressurization and leak checks; main propulsion leak and functional checks; install auxiliary power unit number 1; remove auxiliary power unit number 2; ammonia boiler servicing operations; install window number 5; Orbiter aft closeout operations; stacking of solid rocket boosters in the Vehicle Assembly Building high bay 1. STS 61 work scheduled: payload bay door functional checks and orbital maneuvering system electrical circuit verifications. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 16, 1993.]

September 17:

STS 58: COLUMBIA ROLLS TO PAD

Rollout to Launch Complex 39B began with first motion out of the Vehicle Assembly Building at 10:57 p.m. last night. A minor motor generator problem on the crawler transporter caused a brief delay in the stacked Shuttle's arrival at the pad. KSC spokesman **Bruce Buckingham** said, "When we got up to the ramp, we realized we couldn't make it up to the pad with only eight of the 16 motors. So we had to back it back down." At the foot of the ramp, four additional motors were started and the climb up to the pad was achieved. Ordinarily, the 4.2 mile journey takes about six hours; today's was 11 hours. Pad validations are underway at present. STS 58 work scheduled: terminal countdown demonstration test (TCDT) is set for 11 a.m. Sept. 21; the STS 58 crew will arrive to participate in the TCDT on Saturday; operations to remove and replace auxiliary power units numbers 1 and 3. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 17, 1993; Halvorson, FLORIDA TODAY, Sept. 18, 1993.]

II

SPACE STATION FIGHT RESUMES

Opponents of the Space Station Program - Senator Dale Bumpers (D-Ark.) and Sen. James Sasser (D-TN) - will introduce an amendment seeking to kill the program. Their amendment would be added to an \$87.9 billion appropriations bill for a group of independent federal agencies which includes the Veterans Administration and Department of Housing and Urban Development among others. NASA's budget request of \$14.6 billion, includes \$2.1 billion for the Space Station Program. ["Space Station Faces Big Fight," FLORIDA TODAY, p. 8A, Sept. 18, 1993; Eisler, FLORIDA TODAY, pp. 1A-2A, Sept. 22, 1993.]

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STS 61: APU #2 REMOVED

Endeavour continues to undergo processing for its upcoming STS 61 mission in early December. Completed tasks include: cryogenic tank set pressurization and leak checks; installation of inertial measurement unit; removal of auxiliary power unit number 2. Work in progress: main propulsion leak and functional checks; installation of auxiliary power unit number 1; ammonia boiler servicing operations; installation of window number 5; Orbiter aft closeout operations; stacking of solid rocket boosters in Vehicle Assembly Building high bay 1. STS 61 work scheduled: payload bay door functional checks; orbital maneuvering system electrical circuit verifications; installation of auxiliary power unit number 2. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, September 17, 1993.]

September 20:

STS 58: CREW ARRIVES FOR TCDT

At Launch Complex 39B, pad validations for the STS 58 launch of Columbia were completed after the Orbiter was hard down on the pad. The STS 58 crew arrived to participate in the terminal countdown demonstration test (TCDT). Work in progress today: terminal countdown demonstration test which began at 8:30 a.m., T-O set for 11 a.m. September 21; operations to remove and replace auxiliary power units numbers 1 and 3; main engine valve cycle checks; preparations for helium signature test. STS 58 work scheduled: helium signature test and inertial measurement unit tests. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 20, 1993.]

[]

STS 61: WINDOW NUMBER 5 INSTALLED

Technicians in Orbiter Processing Facility bay 1 have installed Endeavour's window number 5 and have installed and checked out the payload bay flood lights. Work in progress includes: installation of the chin panel; servicing the freon coolant loop; payload bay closeouts; main propulsion leak and functional checks; installation of auxiliary power units 1 and 2; ammonia boiler servicing operations; Orbiter aft closeout operations; stacking of solid rocket boosters in the Vehicle Assembly Building high bay 1. STS 61 work scheduled: payload bay door functional checks; orbital maneuvering system electrical circuit verifications. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 20, 1993.]

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STS 51: DISCOVERY'S LANDING

Nine days after launch from Complex 39's Pad B, Space Shuttle Discovery is scheduled to land at the Kennedy Space Center, and possibly achieve the first KSC night landing. The first landing opportunity is on orbit 143 at 5:28 a.m. EDT tomorrow. A second opportunity is available at KSC one orbit later on orbit 144 and occurs six minutes before sunrise at 7:03 a.m. In each case the retro maneuver, or deorbit burn, is scheduled to occur 57 minutes before the planned touchdown. A landing opportunity is available at KSC on Wednesday (September 22) at 3:56 a.m. and also at Edwards Air Force Base, CA, at 3:47 a.m. EDT. [NASA/KSC RELEASE NO. 117-93, Sept. 20, 1993.]

September 21:

DISCOVERY'S LANDING POSTPONED

Two landing opportunities at Kennedy Space Center were waved off today due to the potential for rain within 30 miles of the Shuttle Landing Facility. There are two KSC landing opportunities tomorrow: 3:56 a.m. EDT on orbit 158 (deorbit burn at 2:57 a.m.) and 5:31 a.m. on orbit 159 (deorbit burn at 4:33 a.m.). Also, there are three landing opportunities tomorrow at Edwards Air Force Base, CA. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 21, 1993.]

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STS 58: APUS REPLACED

At Launch Complex 39B, technicians have removed and replaced auxiliary power units 1 and 3 on Columbia. Main engine valve cycle checks have also been completed. Work in progress at the pad: the terminal countdown demonstration test for STS 58; leak checks of replacement auxiliary power units 1 and 3; inertial measurement unit calibration tests; preparations for helium signature test. STS 58 work scheduled: helium signature test and pre-launch propellant loads. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 21, 1993.]

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STS 61: FLOOD LIGHTS INSTALLED

Endeavour is nearing the end of its current stay in OPF bay 1 and a number of tasks have been completed: main propulsion leak and functional checks; installation of auxiliary power unit 1, window number 5 and the payload bay flood lights which have also been checked. Work in progress today: installation of the chin panel; servicing of the freon coolant loop; payload bay closeouts; orbital maneuvering system electrical circuit verifications; installation of auxiliary power unit 2; ammonia boiler servicing operations; Orbiter aft closeout operations; stacking of solid rocket boosters in Vehicle Assembly Building high bay 1.

Payload bay door functional checks are scheduled. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 21, 1993.]

September 22:

NIGHT LANDING "BEAUTIFUL"

"It was beautiful. I just had the most incredible vista you could imagine," said Shuttle Pilot **William Readdy**. "As we were making our descent, we could see the hangars at Cape Canaveral Air Force Station and we could see down Cocoa Beach and everything." Commander **Frank Culbertson**, described the landing as being "just like training." Discovery and her five-member crew safely touched down at KSC's Shuttle Landing Facility (SLF) at 3:56 a.m. EDT today in what was the first nighttime Shuttle landing at Kennedy Space Center. "It's nice to have the first one under your belt," said KSC Shuttle Launch Director **Robert B. Sieck**. The Orbiter traveled over 4.1 million miles prior to the nominal touchdown on SLF runway 15. Preliminary measurements show the Orbiter touched down about 2,150 feet from the runway 15 threshold. Rollout distance was about 8,350 feet. The vehicle was towed from the SLF beginning at about 7:30 a.m. and was spotted in OPF bay 3 at about 8:40 a.m. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 22, 1993; Halvorson, FLORIDA TODAY, p. 8A, Sept. 23, 1993; Date, THE ORLANDO SENTINEL, pp. A-1 & A-4, Sept. 23, 1993.]

II

STS 58: TCDT COMPLETED

At Launch Complex 39B, Columbia is being readied for its STS 58 launch targeted presently for October 14. The mission's terminal countdown demonstration test (TCDT) has been completed as have inertial measurement unit (IMU) calibration tests. Work in progress today includes: leak checks of replacement auxiliary power units 1 and 3; forward reaction control system pressurization; preparations for the helium signature test which is scheduled; solid rocket booster thermal curtain installation and crew compartment cleaning. Pre-launch propellant loads have been scheduled. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 22, 1993.]

II

STS 61: APU INSTALLATION

Endeavour is undergoing its pre-rollover processing for the STS 61 mission in the Orbiter Processing Facility bay 1. Completed processing tasks include: installation of auxiliary power unit 2; orbital maneuvering system electrical circuit verifications; service of the freon coolant loop; main propulsion leak and functional checks. Work in progress: installation of the chin panel; payload bay closeouts; ammonia boiler servicing operations; Orbiter aft closeout operations; power reactant storage and distribution system tests; stacking of solid rocket boosters in the Vehicle Assembly Building high bay 1. STS 61 work scheduled:

payload bay door functional checks and auxiliary power unit system tests. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 22, 1993.]

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SPACE STATION LIVES: FLORIDA TODAY

"The Senate gave NASA and the Space Station Program a vote of confidence today, propelling America forward on a quest to remain on the cutting edge in science and technology," said Senator Phil Gramm (R-Texas.) The U.S. Senate voted 59-40 against an amendment which would have eliminated money for the project from the NASA budget. [Eisler, FLORIDA TODAY, pp. 1A-2A, Sept. 22, 1993; "Senate Blocks Latest Move to Kill Space Station Funding," THE ORLANDO SENTINEL, p. A-7, Sept. 22, 1993.]

September 23:

STS 58: LEAK CHECKS COMPLETED

Columbia's auxiliary power units have been checked for leaks while the Orbiter awaits its STS 58 launch at Launch Complex 39B. The solid rocket booster thermal curtain has also been installed. Work in progress: helium signature test; preparations for hydrazine servicing of auxiliary power units (APU) 1 and 3; crew compartment cleaning. STS 58 work scheduled: APU servicing overnight tonight; APU hot fire September 28. [SPACE SHUTTLE STATUS REPORT, Sept. 23, 1993.]

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DISCOVERY IN OPF

In OPF Bay 3, Discovery has been jacked and leveled and access platforms are being moved into place around the vehicle. Access into the aft compartment is expected to occur later today. Facility power and purge umbilical lines are being established. The fuel cells have been powered down. Powering up the Orbiter with ground facility power is targeted for approximately 8 p.m. tonight. Inspections of the thermal protection system show five tiles have impacts greater than one inch. [SPACE SHUTTLE STATUS REPORT, Sept. 23, 1993.]

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ENDEAVOUR: RMS TESTING

In Orbiter Processing bay 1, testing of the remote manipulator system is in work today, a functional test of the waste containment system is underway, potable water servicing is in work, and testing of Endeavour's cryogenic reactant system is being performed. Installation of window number 5 is complete. [SPACE SHUTTLE STATUS REPORT, Sept. 23, 1993.]

GAS PIPELINE TO KSC

NASA's Kennedy Space Center today entered into an agreement with City Gas Company Rockledge, FL) to design and construct a pipeline system and to provide natural gas for use at America's spaceport. The agreement specifies that City Gas Co. will pay the entire cost of the pipeline, and that no government funds will be used for this portion of the agreement. The 10-year agreement is effective today and runs through September 23, 2003. The multi-faceted agreement represents a major milestone in KSC's ongoing efforts to reduce energy costs and the center's reliability on petroleum-based fuels. "Natural gas is routinely used around the country and has proven to be both an environmentally and economically sound substitute for many of our current energy sources," said KSC Director **Robert L. Crippen**. "This is a significant step toward making KSC a more energy efficient work place. I'm confident that this transition to natural gas will save millions of tax dollars in the coming years and decades."

Under the terms of the agreement, City Gas Co. will build an estimated 25-mile pipeline linking much of KSC with a main pipeline spur located near Utilities Commission facility, situated south of the NASA Causeway on U.S. Route 1. The pipeline will run along the public rights-of-way of the NASA Causeway and other KSC thoroughfares. Hydraulic dredging will enable the pipeline to cross underneath the Indian River, resulting in no permanent impact to boat traffic. All aspects of the dredging operation will be coordinated with appropriate federal and state officials to assure minimal impact to the Indian River's ecosystem. Construction of the pipeline will begin this fall and should be complete by mid-to-late 1994. Once operational, the pipeline will enable natural gas to be sent to a large portion of the space center where it will be used to fuel objects ranging from government vehicles to water heaters to entire facilities.

Natural gas will eventually be used for many purposes, but one of the initial roles will be in the area of transportation. Officials are planning to convert 126 of the center's buses, sedans, vans and light trucks from gasoline to natural gas-burning vehicles by the end of 1994. The dozens of tour buses based at Spaceport USA will be converted to natural gas beginning in 1996, and many of the center's forklifts and delivery trucks will be running on natural gas in the years following. By the end of the decade, it is estimated that natural gas will be the fuel of choice for more than 75 percent of the space center's land-roving vehicles.

Among other benefits, KSC's switch to natural gas will result in a dramatic increase in combustion emissions around the center. By converting large hot water boilers, vehicles and miscellaneous other equipment to natural gas, the amount of sulfur dioxide and similar emissions will be reduced by about 99 percent by the year 2000. The natural gas pipeline will also nearly eliminate the center's annual need for approximately 500 truckloads of petroleum fuel. A

groundbreaking ceremony to commemorate the start of the pipeline is planned to occur within the next couple of months, and construction will begin immediately thereafter. [NASA/KSC RELEASE NO. 120-93, Sept. 23, 1993.]

September 24: STS 58: HELIUM SIGNATURE TEST

At Launch Complex 39B, the helium signature test for Columbia's STS 58 mission has been completed. Leak checks of replacement apus 1 and 3 have been conducted. The forward reaction control system pressurization has been finished and the solid rocket booster thermal curtain has been installed. Work in progress today: fuel line connections on auxiliary power units 1 and 3; crew compartment cleaning; reaction control system regulator flow checks. STS 58 work scheduled: pre-launch propellant loads; retraction and extension of the pad's rotating service structure; hot firing of auxiliary power units; main engine flight readiness tests and aerosurface cycling; Orbiter midbody umbilical connections and leak checks; SLS-2 late stowage operations (MVAC); launch readiness review and flight readiness review. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 24, 1993.]

[] STS 61: CHIN PANEL INSTALLED

Endeavour remains in OPF Bay 1 for the final pre-rollover processing leading to the Orbiter's STS 61 mission. The vehicle's waste containment system has already been checked. Currently, technicians are: making remote manipulator system checks; payload bay closeouts; ammonia boiler servicing operations; preparations for auxiliary power unit connections; Orbiter aft closeout operations; power reactant storage and distribution system tests and are stacking the mission's solid rocket boosters in the Vehicle Assembly Building high bay 1. STS 61 tasks scheduled: payload bay door functional checks; auxiliary power unit hazardous connections; landing gear functional tests; payload electrical circuits end-to-end test; installation of main engines; inertial measurement unit functional tests and calibrations. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 24, 1993.]

[] STS 60: OPF PROCESSING UPDATE

Discovery, having returned from space last week, is now in OPF bay 3 being processed there for the Orbiter's next mission, STS 60. Completed tasks include: offloading of onboard cryogenic fuels; establishing ground power to the vehicle; main engine bearing drying operations; Orbiter jack and leveling. Work in progress today: gaining access to the aft engine compartment; installation of platforms for Orbiter access; post-flight deconfiguration and checkouts; thermal protection system inspections and repairs. STS 60 work scheduled: opening the payload bay doors; auxiliary power unit inspections; payload removal

(ORFEUS/SPAS & TOS airborne support equipment). [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 28, 1993.]

II

HST STATUS REPORT

Flight hardware integration activities for the upcoming revisit to the Hubble Space Telescope have been underway in the Payload Hazardous Servicing Facility (PHSF) at KSC and are nearing completion. The replacement solar arrays, the latest flight element, arrived at KSC on September 10. During the second week of September the three primary replacement flight elements, which include these twin solar arrays as well as the Corrective Optics Space Telescope Axial Replacement (COSTAR) and the Wide Field Planetary Camera II (WFPC II), were installed in protective enclosures on their respective payload carriers.

Closeout activities in preparation for moving the flight hardware to the Vertical Processing Facility (VPF) began late last week and are concluding today. The payload canister has arrived at the PHSF atop its transporter in preparation for moving the three flight elements to the VPF. The current schedule calls for the flight support structure, which holds the telescope during on-orbit operations, to be installed into the payload canister on Tuesday. This will be followed by the solar array carrier and the orbital replacement unit carrier holding WFPC II and COSTAR on Wednesday. On Thursday the payload canister is to be rotated from the horizontal to vertical position and on Friday will arrive at the VPF to be installed in the east test cell. The three payload elements will undergo routine testing in the VPF during October to verify compatibility and readiness to be integrated with the Space Shuttle Endeavour. In addition, end-to-end testing to verify all communications systems and communications links is planned. The flight hardware is scheduled to go to the pad on October 28. [PAYLOAD STATUS REPORT: STS 61 HUBBLE SPACE TELESCOPE FIRST SERVICING MISSION, Sept. 27, 1993; Date, THE ORLANDO SENTINEL, Sept. 27, 1993.]

September 25:

AWARD WINNERS

Dan Patterson, Vice President of Lockheed Space Operations Co. and Launch Site Director, has been awarded the Public Service Medal from Kennedy Space Center Director **Robert L. Crippen**. Patterson was cited for "exceptional contributions made to NASA's mission accomplishment." Patterson is a 25-year veteran of the aerospace industry and is a resident of Merritt Island, FL. United Technologies USBI has named **Dan Larsen** its employee of the month for September. Three NASA workers received Silver Snoopys from astronauts recently. Astronaut **William Gregory** presented the coveted Snoopys to **Robert Garthwaite**, **Alvaro Diaz** and **Paul Schwindt**. ["Lockheed VP Receives NASA's Highest Award," FLORIDA TODAY, Sept. 26, 1993.]

September 27:

STS 58: RCS FLOW CHECKS

Columbia is sitting atop the pad at Launch Complex 39B and, while there, continues to undergo final processing for its STS 58 mission. The highlight of that mission will be the utilization of Spacelab Life Sciences-2. At LC 39B, technicians have completed reaction control system (RCS) regulator flow checks; the mission's helium signature test; solid rocket booster thermal curtain installation and the forward reaction control system pressurization. Work in progress today includes: fuel line connections on auxiliary power units 1 and 3; crew compartment cleaning; loading of pre-launch propellants; launch readiness review. STS 58 work scheduled this week: hot firing of the auxiliary power units; main engine flight readiness tests and aerosurface cycling; Orbiter midbody umbilical connections and leak checks; SLS-2 late stowage operations (MVAK); and the flight readiness review. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 27, 1993.]

[]

STS 61: PRSD CHECKOUTS

Power reactant and storage distribution (PRSD) checkouts of Endeavour have been completed in OPF bay 1 in preparation for its STS 61 mission to repair the Hubble Space Telescope. The Orbiter's chin panel has been installed and the waste containment system has been checked. Work in progress today: remote manipulator arm checks; payload bay closeouts; ammonia boiler servicing operations; preparations for auxiliary power unit connections; Orbiter aft closeout operations; stacking of solid rocket boosters in the Vehicle Assembly Building's high bay 1. STS 61 work scheduled this week: payload bay door functional checks; auxiliary power unit hazardous connections; landing gear functional tests; payload electrical circuits end-to-end test; install main engines and inertial measurement unit functional tests and calibrations. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 27, 1993.]

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STS 60: FUELS OFFLOADED

In OPF bay 3, technicians working on Discovery have offloaded that vehicle's onboard cryogenic fuels as part of readying it for its next mission: STS 60. Ground power to Discovery has been established; main engine bearing drying operations have been completed as has the Orbiter jack and leveling operation. Work in progress: preparations for removing payloads; post-flight deconfiguration and checkouts; thermal protection system inspections and repairs. Work scheduled includes: auxiliary power unit inspections and payload removal (ORFEUS/SPAS & TOS airborne support equipment). [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 27, 1993.]

September 28:

STS 58: EDWARDS AFB LANDING

The target launch date for Columbia's STS 58 mission is October 14 with a landing scheduled two weeks later at Edwards Air Force Base, CA. because experiments aboard the Spacelab Life Sciences payload must be processed immediately on landing and the processing facilities are located there. Reaction control system regulator flow checks have been completed; leak checks of high-point bleed valves are also finished. The launch readiness review (LRR) for the mission has been completed after meetings this week at Kennedy Space Center. Work in progress this week: preparations for a hotfire of the auxiliary power units 1 and 2; crew compartment cleaning and loading of pre-launch propellants. STS 58 work scheduled: hot firing of the APUs; main engine flight readiness tests and aerosurface cycling; Orbiter midbody umbilical connections and leak checks and the flight readiness review October 1. Launch of Columbia and its seven-member crew is planned for 10:53 a.m.; the launch window extends for another two hours and thirty minutes. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 28, 1993; Date, THE ORLANDO SENTINEL, Sept. 22, 1993; Banke and Halvorson, FLORIDA TODAY, p.9A, Sept. 29, 1993.]

II

STS 61: HUBBLE SPACE TELESCOPE MISSION

Processing work continues on Endeavour during its pre-rollover stint in the Orbiter Processing Facility's bay 1. Completed tasks include: Ku-band checkout with TDRSS; polishing the Orbiter's windows and power reactant and storage distribution (PRSD) checkouts. Today, technicians will be removing, then replacing the Orbiter's flight recorder and conducting auxiliary power unit (APU) checkouts. STS 61 work scheduled: payload bay door functional checks; landing gear functional tests; installation of main engines and inertial measurement unit functional tests and calibrations. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 28, 1993.]

II

STS 60: SPACEHAB-2

Technicians working on Discovery in OPF bay 3 have completed the validation of Orbiter power systems; payload bay doors have been opened and secured; the Ku-band antenna has been deployed and the payloads have been safed. Today, processing workers will prepare to remove the STS 51 payloads; conduct post flight deconfiguration and checkouts and thermal protection system inspections and repairs. STS 60 work scheduled includes: auxiliary power unit (APU) checkouts; payload removal beginning late tomorrow. Technicians will be removing the ORFEUS/SPAS and TOS airborne support equipment. STS 61 will carry a crew of six on its mid-January launch; the mission itself will be eight days and five hours in duration, barring an extension due to poor weather at the Kennedy Space

Center Shuttle Landing Facility. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 28, 1993.]

September 29:

STS 58: AIMING AT OCT. 14

At Launch Complex 39B, technicians have completed loading hypergolic fuels for Columbia's STS 58 mission. Today, pad workers will retract the rotating service structure for APU hotfiring which is set to begin at 2 p.m.; they will extend the rotating service structure after the hot firing and continue preparations for the flight readiness test of the Orbiter's main engines. STS 58 work scheduled: main engine flight readiness tests and aerosurfaces cycling planned for tomorrow; Orbiter midbody umbilical connections and leak checks; SLS-2 late stowage operations (MVAC); flight readiness review set for October 1. [Halvorson, FLORIDA TODAY, p. 1A, Sept. 30, 1993; KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 29, 1993.]

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STS 61: PRSD CHECKOUTS COMPLETED

The Space Shuttle Endeavour remains in OPF bay 1 where it is being readied for its rollover to the Vehicle Assembly Building. Technicians have completed power reactant and storage distribution (PRSD) system and auxiliary power unit checkouts and have loaded mass memory units 1 and 2. Currently the flight recorder is being replaced and preparations are being made for installing the Orbiter's main engines. STS 61 work scheduled: installation of main engines beginning October 1; flushing of the Orbiter's gaseous nitrogen lines and functional checks of the main landing gear. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 29, 1993.]

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STS 60: WAKE SHIELD FACILITY AND SPACEHAB-2

Discovery is being processed in Orbiter Processing Facility bay 3. Technicians in the OPF have validated the Orbiter power systems; deconfigured the Orbiter's aft flight deck and deployed the Ku-band antenna. Today, workers will remove the ORFEUS/SPAS payload in the afternoon and make thermal protection system inspections and repairs. STS 60 work scheduled includes: auxiliary power unit inspections and deconfiguring of the payload bay. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 29, 1993.]

September 30:

APU HOT FIRING COMPLETED

Preparations for the liftoff of STS 58 aboard Columbia continue at Launch Complex 39B. The Orbiter's auxiliary power units have been hot-fired; technicians have also completed pre-launch propellant loads and the rotating service structure has been retracted and extended. Today, workers are conducting

main engine flight readiness tests and aerosurface cycling along with Orbiter midbody umbilical connections and leak checks. STS 58 work scheduled: SLS-2 late stowage operations (MVAC); flight readiness review October 1; pre-launch preparations; Orbiter aft engine compartment closeouts. [Banke and Halvorson, FLORIDA TODAY, p. 9A, Sept. 29, 1993; KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 30, 1993.]

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STS 61: IMU TESTS/CALIBRATIONS

In OPF bay 1, Endeavour has undergone payload bay door functional checks and inertial measurement unit functional tests and calibrations as part of its STS 61 processing before being rolled over to the VAB. Work in progress today: ammonia boiler servicing operations; power reactant storage and distribution system tests; preparations for installing main engines; potable water servicing; freon coolant loop flush and service checks; final auxiliary power unit controller tests; stacking of solid rocket boosters in the Vehicle Assembly Building high bay 1. STS 61 work scheduled: main engine installation; main engine electrical verifications and main propulsion system integrated testing; landing gear functional tests; payload electrical circuits end-to-end test; crew equipment interface tests and checks. The STS 61 crew of seven will arrive this weekend for checks. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 30, 1993.]

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STS 60: PAYLOAD REMOVAL

A number of post-STS 51 tasks have been completed in OPF bay 3 where Discovery is being processed. The payload bay doors have been opened and the ORFEUS/SPAS & TOS airborne support equipment have been removed. Technicians now have access to the aft engine compartment and have installed platforms for Orbiter access. They have also conducted post-flight deconfiguration and checkouts. Work in progress today: positioning the body flap; main engine removal preparations; preparations to remove the forward reaction control system (FRCS); payload bay post-flight and post-payload deployment assessments; assessment of minor damage to the remote manipulator system (RMS); deconfiguring the payload bay. STS 60 work scheduled: removal of the forward reaction control system; offloading of hypergolic fuels; auxiliary power unit inspections. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 30, 1993.]

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STS 60: OPF PROCESSING UPDATE

Discovery, having returned from space last week, is now in OPF bay 3 being processed there for the Orbiter's next mission, STS 60. Completed tasks include: offloading of onboard cryogenic fuels; establishing ground power to the vehicle;

main engine bearing drying operations; Orbiter jack and leveling. Work in progress today: gaining access to the aft engine compartment; installation of platforms for Orbiter access; post-flight deconfiguration and checkouts; thermal protection system inspections and repairs. STS 60 work scheduled: opening the payload bay doors; auxiliary power unit inspections; payload removal (ORFEUS/SPAS & TOS airborne support equipment). [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 28, 1993.]

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HST STATUS REPORT

Flight hardware integration activities for the upcoming revisit to the Hubble Space Telescope have been underway in the Payload Hazardous Servicing Facility (PHSF) at KSC and are nearing completion. The replacement solar arrays, the latest flight element, arrived at KSC on September 10. During the second week of September the three primary replacement flight elements, which include these twin solar arrays as well as the Corrective Optics Space Telescope Axial Replacement (COSTAR) and the Wide Field Planetary Camera II (WFPC II), were installed in protective enclosures on their respective payload carriers.

Closeout activities in preparation for moving the flight hardware to the Vertical Processing Facility (VPF) began late last week and are concluding today. The payload canister has arrived at the PHSF atop its transporter in preparation for moving the three flight elements to the VPF. The current schedule calls for the flight support structure, which holds the telescope during on-orbit operations, to be installed into the payload canister on Tuesday. This will be followed by the solar array carrier and the orbital replacement unit carrier holding WFPC II and COSTAR on Wednesday. On Thursday the payload canister is to be rotated from the horizontal to vertical position and on Friday will arrive at the VPF to be installed in the east test cell. The three payload elements will undergo routine testing in the VPF during October to verify compatibility and readiness to be integrated with the Space Shuttle Endeavour. In addition, end-to-end testing to verify all communications systems and communications links is planned. The flight hardware is scheduled to go to the pad on October 28. [PAYLOAD STATUS REPORT: STS 61 HUBBLE SPACE TELESCOPE FIRST SERVICING MISSION, Sept. 27, 1993; Date, THE ORLANDO SENTINEL, Sept. 27, 1993.]

September 25:

AWARD WINNERS

Dan Patterson, Vice President of Lockheed Space Operations Co. and Launch Site Director, has been awarded the Public Service Medal from Kennedy Space Center Director **Robert L. Crippen**. Patterson was cited for "exceptional contributions made to NASA's mission accomplishment." Patterson is a 25-year veteran of the

aerospace industry and is a resident of Merritt Island, FL. United Technologies USBI has named **Dan Larsen** its employee of the month for September. Three NASA workers received Silver Snoopys from astronauts recently. Astronaut **William Gregory** presented the coveted Snoopys to **Robert Garthwaite**, **Alvaro Diaz** and **Paul Schwindt**. The three were recognized for outstanding contributions to the space program. ["Lockheed VP Receives NASA's Highest Award," FLORIDA TODAY, Sept. 26, 1993.]

September 27:

STS 58: RCS FLOW CHECKS

Columbia is sitting atop the pad at Launch Complex 39B and, while there, continues to undergo final processing for its STS 58 mission. The highlight of that mission will be the utilization of Spacelab Life Sciences-2. At LC 39B, technicians have completed reaction control system (RCS) regulator flow checks; the mission's helium signature test; solid rocket booster thermal curtain installation and the forward reaction control system pressurization. Work in progress today includes: fuel line connections on auxiliary power units 1 and 3; crew compartment cleaning; loading of pre-launch propellants; launch readiness review. STS 58 work scheduled this week: hot firing of the auxiliary power units; main engine flight readiness tests and aerosurface cycling; Orbiter midbody umbilical connections and leak checks; SLS-2 late stowage operations (MVAK); and the flight readiness review. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 27, 1993.]

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STS 61: PRSD CHECKOUTS

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Technicians working on Discovery in OPF bay 3 have completed the validation of Orbiter power systems; payload bay doors have been opened and secured; the Ku-band antenna has been deployed and the payloads have been safed. Today, processing workers will prepare to remove the STS 51 payloads; conduct post

flight deconfiguration and checkouts and thermal protection system inspections and repairs. STS 60 work scheduled includes: auxiliary power unit (APU) checkouts; payload removal beginning late tomorrow. Technicians will be removing the ORFEUS/SPAS and TOS airborne support equipment. STS 61 will carry a crew of six on its mid-January launch; the mission itself will be eight days and five hours in duration, barring an extension due to poor weather at the Kennedy Space Center Shuttle Landing Facility. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 28, 1993.]

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II

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STS 60: WAKE SHIELD FACILITY AND SPACEHAB-2

Discovery is being processed in Orbiter Processing Facility bay 3. Technicians in the OPF have validated the Orbiter power systems; deconfigured the Orbiter's aft flight deck and deployed the Ku-band antenna. Today, workers will remove the ORFEUS/SPAS payload in the afternoon and make thermal protection system inspections and repairs. STS 60 work scheduled includes: auxiliary power unit inspections and deconfiguring of the payload bay. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 29, 1993.]

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Preparations for the liftoff of STS 58 aboard Columbia continue at Launch Complex 39B. The Orbiter's auxiliary power units have been hot-fired; technicians have also completed pre-launch propellant loads and the rotating service structure has been retracted and extended. Today, workers are conducting main engine flight readiness tests and aerosurface cycling along with Orbiter midbody umbilical connections and leak checks. STS 58 work scheduled: SLS-2 late stowage operations (MVAC); flight readiness review October 1; pre-launch preparations; Orbiter aft engine compartment closeouts. [Banke and Halvorson, FLORIDA TODAY, p. 9A, Sept. 29, 1993; KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Sept. 30, 1993.]

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OCTOBER

October 1:

EG&G WINS BOC, AGAIN

NASA has selected EG&G Florida, Inc. (Cocoa, FL) for final negotiations for the Base Operations Contract at the Kennedy Space Center. EG&G Florida's proposed cost is approximately \$1.7 billion, exclusive of fees. The cost-plus-award/incentive fee contract will be for a total potential contract period, including options, of 10 years. As the base operations contractor, EG&G Florida will provide a broad base of support services for the KSC mission, encompassing management, operation, maintenance and engineering for KSC's utilities and facilities; health, fire and security services; and certain technical and administrative operations.

These support services are for NASA and other NASA contractors and tenants at KSC, Cape Canaveral Air Force Station and a limited number of other locations. NASA's original selection for this contract award - to Lockheed Space Operations Co. - was made in November 1993, but was protested to the General Services Administration Board of Contract Appeals. As a result of settling this protest, NASA agreed to revise the solicitation and to recompet. EG&G Florida, Inc., the incumbent contractor, has continued to provide base operations support during the recompetition process. [NASA/KSC NEWS RELEASE C93-W, Oct. 1, 1993; Liden and Halvorson, FLORIDA TODAY, pp. 1A-2A, Oct. 2, 1993.]

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STS 58: FLIGHT READINESS TESTS

Columbia's number 2 and 3 main engines have undergone flight readiness tests at Launch Complex 39B. The Orbiter's aerosurfaces have been cycled and technicians have completed Orbiter midbody umbilical connections and leak checks. Work in progress today: SLS-2 late stowage operations (MVAC); flight readiness review (FRR); flight readiness test (FRT) of engine 1 and replacement of main engine number 1 oxidizer preburner oxidizer valve actuator that failed during FRT; Orbiter aft engine compartment closeouts. STS 58 work scheduled for next week: main engine hydraulic closeouts; pre-launch preparations; continue with Orbiter aft engine compartment closeouts; continue with SLS-2 late stowage operations (MVAC). [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 1, 1993.]

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STS 61: NEW TESTS FOR HST CAMERA

Based on an independent optics panel's assessment for NASA, mission managers have decided to return the Wide Field/Planetary Camera (WFPC) II to the Payload Hazardous Servicing Facility (PHSF) at KSC for possible additional testing prior to the STS 61 Hubble servicing mission. WFPC had already been installed into

the payload canister and was in the process of being transported to the Vertical Processing Facility when the decision was reached yesterday to return to the PHSF. Potential risks associated with performing the tests are currently being evaluated. A decision on what tests will be performed is expected in the next few days. No impact to the camera's readiness for launch is expected.

Ammonia boiler servicing operations have been completed on Endeavour which remains in OPF bay 1. Preparations for installing the main engines have been made; tests of the modular auxiliary data systems (MADS) recorder have also been conducted. Work in progress today: main engine installation; final auxiliary power unit controller tests; power reactant storage and distribution system tests; potable water servicing; freon coolant loop flush and service checks; stacking of solid rocket boosters in the Vehicle Assembly Building's high bay 1. STS 61 work scheduled for next week includes: main engine electrical verifications and main propulsion system integrated testing; landing gear functional tests; payload electrical circuits end-to-end tests; crew equipment interface tests and checks and the arrival of the STS 61 crew on October 3. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 1, 1993.]

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STS 60: HYDRAULIC OPERATIONS COMPLETED

Discovery continues to undergo processing activities aimed at readying the Orbiter for its STS 60 mission targeted now for mid-January of 1994. Hydraulic operations are finished as well as the positioning of the vehicle's body flap. Inspections showed minor damage to the remote manipulator system (RMS). The Shuttle's forward reaction control system has been removed. Work currently underway includes: body flap checks; main engine inspections and removal preparations; payload bay post-flight and post-payload deploy assessments; deconfiguring of the payload bay. STS 60 work scheduled for next week [October 4-8]: offloading hypergolic fuels (SCAPE Operations); auxiliary power unit inspections; waste management post-flight servicing and removal and replacement of fuel cells 2 and 3. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 1, 1993.]

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STS 58: LIFTOFF OCTOBER 14

Shuttle managers today targeted October 14, 1993, for launch of the Space Shuttle Columbia and the second Spacelab Life Sciences (SLS-2) mission. The vehicle and its payloads were declared ready for launch following today's Flight Readiness Review at NASA's Kennedy Space Center. The 2 1/2 hour launch window on the 14th opens at 10:53 a.m. EDT. The 14-day mission will be commanded by **John Blaha** and piloted by **Rick Searfoss**. Rounding out the 7-member crew will be Mission Specialists **Rhea Seddon**, **Bill McArthur**, **David Wolf** and **Chignon Lucid**, and Payload Specialist **Martin Fettman**. STS 58 represents the 58th Space Shuttle

flight and the 15th for Columbia. [Halvorson, FLORIDA TODAY, P. 5A, Oct. 1, 1993; Halvorson, FLORIDA TODAY, p. 1A, Oct. 2, 1993; LAUNCH ADVISORY: DATE SET FOR STS 58 MISSION, Oct. 1, 1993.]

October 3:

SSME PART RETESTED

When a main engine part failed its test last week it was replaced; the new test for the replacement part takes place this morning. The original part was a valve in the liquid oxygen plumbing of main engine number 1. When the new part is tested, workers will move on to more routine pre-launch activities: the installation of ordnance and pressurization of Columbia's propellant storage tanks. Workers will also stock provisions for the Orbiter's two week mission. Landing will occur at Edwards Air Force Base, CA, to give the commander more margin for error after having been in space for two weeks. [Banke, FLORIDA TODAY, p. 18A, Oct. 3, 1993.]

October 4:

STS 58: FRR COMPLETED

Columbia's flight readiness review was completed October 1; the vehicle's water spray boilers have been serviced and, over the weekend, technicians successfully carried out the flight readiness test of the Orbiter's engines. Currently, technicians are mating and leak-checking the Orbital midbody umbilical unit; conducting the Orbiter aft confidence test and starting aft closeouts; stowing Spacelab hardware and minor payload equipment. Launch countdown preparations begin today. Aft compartment closeouts are scheduled to continue this week as are other launch preparations. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 4, 1993.]

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STS 61: MAIN ENGINES INSTALLED

Over the past weekend, Endeavour's three main engines were installed and the Orbiter's freon system was flushed as part of pre-rollover preparations. Work in progress today: potable water servicing; securing of main engines; closeouts of the Orbiter's forward compartment and purging of the gaseous nitrogen lines. STS 61 work scheduled for the week: leak checks of the main engines and checkouts of the Orbiter's closed circuit television. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 4, 1993.]

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¹STS 60: MID-JANUARY LAUNCH TARGETED

Discovery's next mission is targeted for mid-January 1994; its primary payloads will be the Wake Shield Facility and Spacehab 2. Current completed tasks include: removal of the STS 51 Orfeus/Spas payloads and a dump of the Orbiter's flight recorder data. Work in progress today: inspections of the Orbiter's 17-inch

disconnect; thermal protection system inspections and repairs; removal of fuel cells 2 and 3 and removal of the engine heatshields. Scheduled STS 60 tasks: deconfiguring of the payload bay; removal of the main engines and removal of the Orbiter's forward reaction control system (FRCS). The STS 60 mission will carry a crew of six astronauts and last for 8 days and 5 hours with a planned landing at Kennedy Space Center. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 4, 1993.]

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ONE DEAD IN SR 3 ACCIDENT

One person was killed and two others were injured in a three-car accident at Kennedy Space Center this morning. **Dick Young**, a spokesman for KSC, said that the driver of a 1987 Subaru sedan died in the crash. The name of the deceased was not released, pending notification of the family. The accident occurred after the victim, who was driving south in the northbound lane of Courtenay Parkway (also known as State Road 3), struck two oncoming vehicles. The injured drivers in the other autos were identified as **George Folmar** and **Gail Walker**, both of Merritt Island. They were treated for minor injuries and were released. ["Car Crash Claims One at KSC," FLORIDA TODAY, p. 2B, Oct. 5, 1993.]

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HERNANDEZ ENGINEERING WINS AWARD

NASA Administrator **Daniel S. Goldin** announced today the recipients of the Minority Contractor and Subcontractor of the Year Awards in recognition of minority businesses that have made outstanding contributions to NASA. Hernandez Engineering, Inc. (Houston, TX) was named Minority Contractor of the Year; AJT and Associates, Inc. (Cape Canaveral, FL) was named Minority Subcontractor of the Year. "As we continue to strive to meet our goals in minority subcontracting, all of NASA takes pride in seeing the excellence provided by Hernandez Engineering and AJT and Associates."

Hernandez Engineering, Inc., nominated by the Kennedy Space Center, was cited for providing outstanding and critical technical support in safety engineering, industrial engineering, and software support to the KSC Directorate of Safety, Reliability and Quality Assurance as part of the Space Shuttle Program. Hernandez was cited for creative problem solving techniques, strong management leadership and efficient resource utilization and cost control. Hernandez was nominated as a finalist for this award last year by the Johnson Space Center (Houston, TX). Their president, Miguel A. Hernandez, Jr., is currently serving on NASA's minority resources advisory committee.

AJT and Associates was nominated by USBI Facilities Group of the United Technologies Corp., a prime contractor at KSC, managed by the Marshall Space

Flight Center (Huntsville, AL). AJT's president, Alfredo J. Teran, is the founder and president of the Minority Business Enterprise Alliance of Florida. AJT provided high quality architect/engineering services that assisted USBI in meeting and exceeding the prime contract statement of work. The award citation notes that AJT is an outstanding firm that has consistently provided excellent support to KSC for many years. [NASA/KSC Release: 93-177, Oct. 4, 1993; "KSC Contractors AJT, Hernandez Engineering Earn Business Awards," FLORIDA TODAY, Oct. 10, 1993.]

October 5:

STS 58: MAIN ENGINE TESTS

The Space Shuttle Columbia is at Launch Complex 39B awaiting its October 14 launch on the STS 58 mission. The Orbiter's main engines have undergone a flight readiness test and hot gas leak checks. The first phase of SLS-2 late stowage operations has been completed. Orbiter mid-body umbilical connections and leak checks are now completed as well. Work in progress: main engine hydraulic closeouts; Orbiter aft engine compartment closeouts and the installation of extravehicular mobility units (spacesuits). STS 58 tasks scheduled: ordnance installation; external tank purges; pressurizing the hypergolic fuel system; repressurization of auxiliary power unit fuel/oxidizer systems and the second phase of SLS-2 late stowage operations (MVAK). [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 5, 1993.]

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STS 61: CEIT HELD

The STS 61 crew has been on hand at Kennedy Space Center to take part in crew equipment interface tests (CEIT) and checks. The Endeavour main engines have been installed and final auxiliary power unit controller tests have been conducted. Freon coolant loop flush and service checks have also been completed. Current tasks include: main engine securing operations and integrated testing; power reactant storage and distribution system (PRSD) tests; potable water servicing; Orbiter mid-body closeouts; stacking of solid rocket boosters in the Vehicle Assembly Building high bay 1. STS 61 tasks scheduled include: main engine electrical verifications and main propulsion system integrated testing; landing gear functional tests; payload electrical circuits end-to-end test. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 5, 1993.]

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STS 60: BODY FLAP CHECKS

Workers in the Orbiter Processing Facility bay 3 have removed Discovery's landing gear and tire assemblies, made body flap checks and offloaded hypergolic fuels. These activities are part of the turnaround processing activities that the Orbiter has undergone since the completion of its STS 51 mission. Work in progress: main engine inspections and removal preparations; heatshield removal;

payload bay post-flight and post-payload deploy assessments; deconfiguring the payload bay and preparations to remove and replace fuel cells 2 and 3. STS 61 work scheduled: removal of the main engines; auxiliary power unit inspections; waste management post-flight servicing; removal and replacement of fuel cells 2 and 3. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 5, 1993.]

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KSC OFFICIALS SPEND DAY IN WHEELCHAIRS

Led by Center Director **Robert L. Crippen**, five top managers at Kennedy Space Center spent the day in wheelchairs today as part of KSC's observance of National Disability Employment Awareness Month. Crippen volunteered to participate in the event which was arranged by KSC's Disability Awareness and Action Working Group, co-chaired by **Hugh Harris**, Director of Public Affairs for the Space Center, and **Leon Wichman** of the NASA Procurement Office. Harris also volunteered to spend the day in a wheelchair. Crippen then invited top local officials of four major contractors at KSC to join them in becoming more aware of and sensitive to the everyday challenges in the work place facing people who are disabled.

The contractor participants today were **Jim Dubay**, President and General Manager of EG&G Florida, Inc.; **George Faenza** Vice President and General Manager of McDonnell Douglas Aerospace KSC Division; and **Lee Solid**, Vice President and General Manager of Rockwell International Corp., Space Systems Division. **Gerry Oppliger**, President of Lockheed Space Operations Co., was out of town today, but is planning on participating at a later date. "The center is committed to making it possible for every employee to work up to their full potential," Crippen said. "We have about 186 civil service employees and scores of contractor employees with disabilities who are making a major contribution to the space program." [NASA/KSC Release No. 123-93, Oct. 6, 1993.]

October 6:

PLAYALINDA BEACH CLOSING

Playalinda Beach will be closed to the public beginning Sunday at sunset due to next week's planned launch of the Space Shuttle Columbia on STS 58. Assuming a successful launch October 14, the beach will be open again to the public at 6 a.m. October 15. Other Canaveral National Seashore beaches, such as Apollo Beach, will not be affected by the closing of Playalinda and will remain open during the launch of Columbia next Thursday. [NASA/KSC Release No. 125-93, Oct. 6, 1993.]

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STS 58: EVA SUITS INSTALLED

"We're in good shape. We're right on schedule and we aren't working any problems," said KSC spokesman **Bruce Buckingham** in the course of briefing journalists about the pre-launch process for STS 58. Technicians at Launch Complex 39B have installed extravehicular mobility units (spacesuits) in Columbia and have completed main engine hydraulic closeouts. Work in progress today: final ordnance installation; pressurizing hypergolic fuel system; repressurizing auxiliary power unit fuel/oxidizer systems; pre-launch preparations. STS 58 activities scheduled: Orbiter aft engine compartment closeouts; external tank purges; second phase of SLS-2 late stowage operations (MVAC); mid-deck payload stowage; the countdown is scheduled to begin at 12 a.m. October 11; the STS 58 crew arrival is expected to be at 1:30 p.m. on October 11. [Halvorson, FLORIDA TODAY, p. 6A, Oct. 7, 1993; KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 6, 1993; Halvorson, FLORIDA TODAY, Oct. 7, 1993.]

II STS 61: KU-BAND ANTENNA STOWED FOR FLIGHT

Technicians working in the OPF's high bay 1 have stowed Endeavour's Ku-band antenna aboard the Orbiter; they have completed main engine securing operations and, in the VAB, other workers have stacked the solid rocket boosters in high bay 1 preparatory for mating with the Orbiter after rollover. Work in progress in behalf of the Hubble Space Telescope servicing mission: main engine integrated testing and heatshield installation; final stowage of flight tools; retest of auxiliary power units; power reactant storage and distribution system (PRSD) tests; potable water re-servicing; Orbiter mid-body closeouts; mating of external tank to solid rocket boosters in the VAB's high bay 1. STS 61 work scheduled: main engine electrical verifications and main propulsion system integrated testing; landing gear functional tests; payload electrical circuits end-to-end test; and open the payload bay doors. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 6, 1993.]

II STS 60: MAIN ENGINES INSPECTED

In Orbiter Processing Facility bay 3, technicians have completed an inspection of Discovery's main engines and have made preparations to remove and replace fuel cells 2 and 3. In addition, orbital maneuvering system helium vent operations have been completed. Current processing activities include: main engine removal preparations; engine heatshield removal; removal and replacement of fuel cells 2 and 3; deconfiguration of the payload bay. Work scheduled: remove the main engines; inspect the auxiliary power units; service the waste management system and remove the right side main landing gear wheel and tire assembly. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 6, 1993.]

October 7:

SLS-2 STOWAGE TODAY

The final activities to prepare the Spacelab Life Sciences-2 laboratory for flight start shortly before the countdown clock begins counting October 11 at 12 a.m. EDT. A 75-member NASA/contractor team from Kennedy Space Center, Ames Research Center and McDonnell Douglas is responsible for the laboratory's last hours on the ground. Work begins with the 12-hour activation of the Gas Analyzing Mass Spectrometer (GAMS) which analyzes crew respiration, at 12 a.m. Monday (October 11). Extra food bars for the rodents will be stowed at about 3 a.m. Monday.

On Tuesday (12th) at 12:30 p.m. the SLS-2 laboratory will be powered up. Refrigerators that will hold samples and specimens collected during the 14-day mission, will be turned on and temperatures checked. Also on Tuesday, the team will activate and check the life support systems of the Research Animal Holding Facility (RAHF), which will hold the rodents during the mission. The rodent's initial supply of food has already been attached to the food trays and the water supply topped off.

At 2 a.m. Wednesday (13th) the chemicals and materials for processing blood and tissue samples will be transported from the Hangar L Life Sciences Facility on Cape Canaveral Air Force Station to the launch pad for storage inside the laboratory refrigerators. At 4 a.m. Wednesday, four dozen rodents will be loaded into the module for flight. Should a 24-hour scrub turnaround become necessary, no SLS-2 activity is required. After two launch attempts, however, launch would not be rescheduled for 72-hours to allow replacement of the rodents and time-critical experiment processing materials. [NASA/KSC Release No: 128-93, Oct. 7, 1993.]

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HST SERVICING MISSION UPDATE

Testing using the Cargo Integrated Test Equipment (CITE) at KSC begins October 8 in the Vertical Processing Facility. First is the Interface Verification Test (IVT). This is an electrical test to verify the readiness and compatibility of the HST systems to be integrated with the Space Shuttle Endeavour and to be commanded as necessary from the flight deck. Undergoing testing is the complete path and associated circuitry. Connected are the solar array carrier with the flight support structure, the orbit replaceable unit carrier with the flight support structure, and Endeavour's flight deck with the flight support structure. From the flight deck the astronauts can command power and various latches and heater circuits as well as monitor telemetry from HST while it is attached to the flight support structure.

To follow on October 9 (Saturday) will be the end-to-end test which will verify the ability of the Johnson Space Center in Houston to monitor and communications network. This consists of the MILA tracking station at KSC connected by satellite to the communications switching and distribution facilities at the Goddard Space Flight Center (Greenbelt, MD) where the signals are forwarded to Houston. This communications test is scheduled to last about eight hours. The HST flight hardware arrived at the Vertical Processing Facility on Wednesday and was installed in the east test cell. Yesterday the solar array drive electronics were installed. The Wide Field Planetary Camera (WFPC II) was delivered to Spacecraft Hangar AE early on Sunday (October 3), a highly clean spacecraft checkout facility used for the WFPC's final assembly and initial checkout upon arrival at the Cape.

NASA managers have decided to conduct a test to revalidate the focal point of WFPC II at Spacecraft Hangar AE next week. The test procedure and parameters are currently being developed. Performance of the test will not affect payload readiness to meet the STS-61 launch date. Neither the WFPC II nor the Corrective Optics Space Telescope Axial Replacement (COSTAR) are required for CITE testing. The WFPC II will be returned to the Payload Hazardous Servicing Facility (PHSF) upon completion of testing where it will rejoin the other flight elements before going to the launch pad at the end of October. [STS-61 PAYLOAD STATUS REPORT: HST FIRST SERVICING MISSION, Oct. 7, 1993; Banke, FLORIDA TODAY, p. 5A, Oct. 9, 1993.]

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STS 58: FINAL ORDNANCE INSTALLATION

At Launch Complex 39B, technicians have finished installing Columbia's ordnance. They have also repressurized the auxiliary power unit fuel/ oxidizer systems and pressurized the hypergolic fuel system. Current processing activities include: Orbiter aft engine compartment closeouts; external tank purges; pre-launch preparations; potable water servicing and filter checks; loading the Orbiter's mass memory units and post-ordnance installation operations. STS 58 work scheduled: the second phase of SLS-2 late stowage operations (MVAC); mid-deck payload stowage; start of the countdown and crew arrival on October 11. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 7, 1993.]

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STS 61: ET MATING TO SRBS COMPLETED

In the Vehicle Assembly Building's high bay 1 an STS 61 milestone was accomplished today: the mission's external tank was mated to its solid rocket boosters. In OPF bay 1, technicians made final stowage of flight tools aboard Endeavour. Work in progress includes; main engine integrated testing, heatshield installation and electrical verifications; power reactant storage and distribution

system (PRSD) tests; auxiliary power unit tests; potable water servicing and filter checks; Orbiter mid-body closeouts. STS 61 tasks scheduled: landing gear functional tests; payload electrical circuits end-to-end test; opening payload bay doors and frequency response test. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 7, 1993.]

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STS 60: 17-INCH DISCONNECT INSPECTED

Discovery is undergoing processing for its mid-January 1994 STS 60 mission in Orbiter Processing Facility bay 3. Completed tasks include: inspections of the Orbiter's 17-inch disconnect; main engine removal preparations; engine heatshield removal; removal and replacement of fuel cells 2 and 3; removal of the left side main landing gear wheel and tire assembly. Work in progress currently: removal of the main engines; deconfiguration of Discovery's payload bay; leak checks of replacement fuel cells 2 and 3. STS 60 work scheduled: auxiliary power unit (APU) inspections; waste management post-flight servicing; removal of the rightside main landing gear wheel and tire assembly; Ku-band integrated tests; main propulsion system leak and functional tests. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 7, 1993.]

October 8:

STS 58: EXTERNAL TANK PURGES

Technicians working at Launch Complex 39B have completed external tank purges, loaded the Orbiter's mass memory units and finished post-ordnance installation operations. Work in progress today at the pad include: Orbiter aft engine compartment closeouts; pre-launch preparations; potable water servicing and filter checks; mid-deck payload stowage. STS 58 work scheduled: the second phase of SLS-2 late stowage operations; countdown beginning at 12 a.m. October 11; crew arrival at 1:30 p.m. October 11; fueling of external tank set to begin at 2:33 a.m.; launch to begin at 10:53 a.m. October 14. [Halvorson, FLORIDA TODAY, p. 9A, Oct. 8, 1993; KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 8, 1993.]

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STS 61: APU TESTS

Endeavour continues to undergo pre-rollover processing in OPF bay 1. Completed tasks include: power reactant storage and distribution system (PRSD) tests; auxiliary power unit (APU) tests; mechanical and electrical connections attaching external tank to the solid rocket boosters. Current tasks include: main engine integrated testing, heatshield installation and electrical verifications; potable water servicing and filter checks; landing gear functional tests; Orbiter mid-body closeouts; preparations for frequency response test; cycling the payload bay doors; payload integrated verification tests. STS 61 work scheduled next week: payload electrical circuits end-to-end test; frequency response test and flight

control final cycling; standard payload bay cleaning and closing of payload bay doors prior to rollover to the Vehicle Assembly Building (VAB); Orbiter aft engine compartment closeouts; forward compartment and forward reaction control system structural leak checks; potable water system leak and functional tests. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 8, 1993.]

II

STS 60: FUEL CELL REPLACEMENTS

Technicians processing Discovery for its next mission - STS 60 - have removed and replaced fuel cells 2 and 3. They have also removed the Orbiter's main engines and have transported them to the VAB. Currently, processing technicians are: continuing post-flight (STS 51) payload bay debris assessments; conducting leak checks of replacement fuel cells 2 and 3; configuring zero-G strongbacks for cycling payload bay doors and cycling the external tank doors. STS 60 work scheduled for next week: humidity separator tests; radiator mechanical functional checks; fuel oil voltage checks; auxiliary power unit inspections; waste management post-flight servicing; removal of the rightside main landing gear wheel and tire assembly; Ku-band integrated tests; main propulsion system leak and functional tests. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 8, 1993.]

October 11:

STS 58: ASTRONAUTS ARRIVE

"We're really happy to be here and proud to be here on behalf of everybody in the country and NASA who have been working so hard on this mission," said STS 58 Commander **John Blaha** on his arrival today at Kennedy Space Center. "We're looking forward to a launch on Thursday [October 14]," he added. Air Force meteorologists predict an 80 percent chance of favorable weather. [Banke, FLORIDA TODAY, p. 4A, Oct. 12, 1993; "Astronauts Set for Longest Shuttle Mission," THE ORLANDO SENTINEL, Oct. 12, 1993; Halvorson, FLORIDA TODAY, p.1A, Oct. 10, 1993.]

October 13:

STS 51 HARDWARE INVESTIGATION

NASA Associate Administrator for Space Flight **Jeremiah W. Pearson** today announced the formation of an investigation board to examine the causes of a simultaneous detonation of two Super*Zip explosive ords, one primary and the other a backup, that occurred during the deployment of the Advanced Communications Technology Satellite (ACTS) and the Transfer orbit Stage (TOS) booster from Discovery during STS 51 (September 12-20, 1993). The board will submit an initial report to Pearson by mid-November. A final report of the findings of the review will be submitted by early December.

The board will be headed by **Robert T. Wingate**, Systems Engineering and Operations, Langley Research Center (LaRC), Hampton, VA. Other members of the team include **Michael A. Grainfield**, Office of Safety and Mission Assurance, Headquarters (HQ); **Charles R. Gunn**, Office of Space Science, HQ; **Keith L. Hudkins**, Office of Space Flight, HQ; **Lawrence J. Bement**, Systems Engineering and Operations, LaRC; **Robert M. Stephens**, Office of the General Counsel, HQ; **Robert W. Moss**, Systems Engineering and Operations, LaRC; and **Tommy W. Holloway**, Office of Space Flight, HQ.

Significant data on the anomaly has been gathered. Earlier this month, NASA technicians, while performing post-flight inspections of Discovery following the STS 51 mission, found debris damage to the aft bulkhead, consisting of surface damage on thermal insulation, some penetration of the insulation and payload bay liner and one penetration of the bulkhead wall. The damage was discovered and categorized when Discovery's payload bay was opened and the area was closely inspected in the processing hangar. [NASA/KSC RELEASE: 93-184, Oct. 13, 1993.]

II

STS 58: LAUNCH MINUS 1 DAY

The countdown for Columbia's launch continues without problem today. Yesterday, work to load cryogenic fuels into the Orbiter storage tanks and the extra extended duration Orbiter tanks was completed on time and the pad was reopened for regularly scheduled operations. Following fueling operations the Orbiter mid-body umbilical unit was demated from the vehicle. Final late stowage of experiments into the Spacelab will continue throughout today. Also, Orbiter communications activation and final vehicle and facility closeouts are in work today.

This morning, preparations were made to retract the rotating service structure to launch position. First motion occurred at about 11 a.m. At about 2:33 a.m. tomorrow, operations will begin to load the external tank with more than 500,000 gallons of liquid hydrogen and liquid oxygen. Operations toward that milestone are proceeding without problem. Forecasters indicate a ten percent probability of weather prohibiting launch tomorrow. The winds at Launch Complex 39B are expected to be from the east at 10 to 14 knots; temperature 78 degrees F; visibility 7 miles; and clouds scattered at 3,000, 8,000, and 25,000 feet. The 24-hour delay forecast reveals an increasing threat of high upper level winds and additional cloud coverage at KSC during the launch window and lists a 30 percent chance of violation.

Today, the seven-member astronaut crew for this mission have been given a briefing on tomorrow's weather outlook and completed their review of launch day activities and mission plans. Commander **John Blaha**, Pilot **Richard Searfoss**, and

mission specialist **Bill McArthur** flew in the Shuttle Training Aircraft earlier today. The crew will be granted several hours of free time this afternoon and be ready for sleep at about 9:30 p.m. They will be awakened tomorrow at various times ranging from 5:33 to 5:58 a.m. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 13, 1993; Halvorson, FLORIDA TODAY, pp. 1A-2A, Oct. 13, 1993.]

October 14: RANGE SAFETY PROBLEM SCRUBS LAUNCH

The countdown for the launch of Columbia's STS 58 mission was halted today at the T-31 second mark at about 12:52 p.m. due to the failure of a range safety destruct command processor. The computer system was reinitiated and declared ready to proceed with another attempt tomorrow. The window for tomorrow's attempt is open from 10:53 a.m. until 1:21 p.m. EDT. Following the scrub, the external tank was drained of its cryogenic propellants. At 2:33 a.m. tomorrow, operations will begin to reload the external tank with more than 500,000 gallons of liquid hydrogen and liquid oxygen. Forecasters late Thursday indicate a 70 percent probability of weather prohibiting launch tomorrow. The primary concerns are for possible thunderstorms and unacceptable cloud coverage. The winds at Launch Complex 39B are expected to be from the southeast at 10 knots; temperature 80 degrees F; visibility 7 miles or greater; and clouds scattered to broken at 3,000, 8,000 and 25,000 feet. The 72-hour delay forecast lists a 20 percent chance of violation. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 14, 1993; Notice to Editors/News Directors: Launch of Columbia on Mission STS 58 Rescheduled, Oct. 14, 1993; Date, THE ORLANDO SENTINEL, p. A-4, Oct. 14, 1993.]

II

ANIMAL RIGHTS PROTEST

Nine animal rights activists protested NASA's planned decapitation of six rats on its upcoming STS 58 mission. "Why waste these rats' lives? They feel pain and torture like anyone else. It's a disrespect for life," according to **Chris Kohler**, Managing Director of the Animal Rights Foundation of Florida. NASA's position is that the beheadings were a necessary part of an experiment to gauge the effects of weightlessness on humans. [Date, THE ORLANDO SENTINEL, Oct. 11, 1993; Evans, FLORIDA TODAY, p. 6A, Oct. 15, 1993.]

October 15: STS 58: SECOND SCRUB

The launch of the Space Shuttle Columbia was scrubbed today at the T-9 minute mark at about 11:08 a.m. due to the failure of an S-Band transponder on the Orbiter. This system is one of two transponders that are used for communications between the Orbiter and ground controllers. Mission managers and engineers have determined that it will take six to eight hours to replace the failed system once

technicians are given access to the pad following de-tanking operations later today. Because of the turnaround cycle required for some of the Spacelab payloads, managers have set the new launch date for Monday, October 16. "We were at a point in the count where we couldn't recover in time," said Air Force Col. **Bill Sample**. The window for Monday's attempt is open from 10:53 a.m. until 1:17 p.m. EDT.

Launch controllers are currently working under a 72-hour scrub turnaround sequence. The countdown is expected to pick-up again at the T-11 hour mark at 9:33 p.m. Sunday night. The seven-member crew will remain at KSC during this turnaround sequence. No onboard Orbiter cryogenics or auxiliary power unit propellants need to be replenished for the launch attempt on Monday (October 18). Forecasters today have indicated a 20 percent probability of weather prohibiting launch on Monday. The only concerns are for possible isolated showers and a limited chance for crosswind violations at the Shuttle Landing Facility. The winds at Launch Complex 39B are expected to be from the east at 10 knots; temperature 80 degrees F; visibility 7 miles or greater; and clouds scattered at 3,000 feet. The 24-hour delay forecast lists a 30 percent chance of violation with similar conditions. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 15, 1993; Date, THE ORLANDO SENTINEL, Oct. 15, 1993.]

October 18:

COLUMBIA THUNDERS ALOFT

"This is just spectacular to see something that's gone through so much planning and so much endeavor finally launch," said NASA Science Advisor **Victor Schneider**. He was on hand for the successful launch of Columbia on its STS 58 mission. The liftoff came just 10 seconds behind schedule; a U.S. Customs aircraft was in the restricted flight area. The STS 58 mission is dedicated to finding out as much as possible about the effects of weightlessness on humans. [Banke, FLORIDA TODAY, pp. 1A-2A, Oct. 19, 1993.]

II

NASA: ADVANCE HUBBLE LAUNCH

NASA managers are talking about advancing the launch date of the STS 61 Hubble Repair Mission of Endeavour from December 2 until November 30. There is a problem with that scheduling, however; an Air Force rocket carrying a military satellite is set to liftoff on November 28. NASA officials are trying to ensure that enough time in the schedule exists to get Endeavour back in the OPF at KSC before Christmas. **Loren Shriver**, NASA Manager of Shuttle Launch Integration said, "I think we are hoping that by say a week or so from now to have our final decision." The STS 61 mission will have an unprecedented number of spacewalks, from five to seven, depending on the need for time to make the Hubble repairs. [Halvorson, FLORIDA TODAY, Oct. 19, 1993.]

October 20:

STS 61: LEAK CHECKS COMPLETED

Workers in OPF bay 1 have completed their aft leak checks of Endeavour prior to its being rolled over to the Vehicle Assembly Building (VAB). Technicians have also completed: Orbiter compartment positive pressure tests and airlock pressure checks and leak tests. Work in progress today: landing gear final tire pressure top off; retract main and nose landing gears; Orbiter jackdown, weight and center of gravity checks; Orbiter mate to Orbiter transport system (OTS). STS 61 work scheduled: rollover to the VAB tomorrow; mating to the mission external tank; rollout to Launch Complex 39A on October 28. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 20, 1993; Date, THE ORLANDO SENTINEL, p. A-7, Oct. 19, 1993.]

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STS 60: DISCOVERY IN OPF BAY 3

Discovery continues to undergo processing activities in OPF Bay 3. Fuel cell single cell voltage checks and preparations for APU leak and functional tests have been completed. Current STS 60 tasks underway: main propulsion system leak and functional tests; auxiliary power unit (APU) leak and functional tests; eleven flipper door checks; power reactant storage and distribution system (PRSD) tests; main landing gear wheel, tire assembly and brake replacement; waterproofing of the chin panel; waste management post-flight servicing; Ku-band integrated tests; S-Band communication system checks. STS 60 work scheduled: water spray boiler checkout and servicing and the resumption of stacking the right-hand solid rocket boosters in VAB high bay 3 following the rollover of Endeavour tomorrow. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 20, 1993.]

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SPACE STATION MANAGEMENT

NASA Administrator **Daniel S. Goldin** today announced the Office of Space Flight will assume responsibility for management of the Space Station Program. **Jeremiah W. Pearson III**, Associate Administrator for Space Flight, will lead the integration of these major programs. "Our planned Space Shuttle flight activities are becoming increasingly more involved with our Space Station planning," Goldin said. "These programs, of necessity, must be more closely integrated. The Space Shuttle will be a key element of the redesigned Space Station program and in all presently planned human space flight activities with Russia." Details of the merger of these two programs at NASA Headquarters are under development and will be announced soon.

Goldin also named **William Shepherd** as the Space Station Program Manager at the Johnson Space Center (JSC), Houston. He is currently an Assistant Deputy Administrator (technical) at NASA Headquarters and has been leading the day-to-

day transition activities for the Space Station Program. Shepherd and the new Space Station Program Office at JSC will assume responsibility for the program and related transition activities effective immediately. Program Directors for the Space Shuttle and Space Station, reporting to Pearson, will be responsible for all activities of the respective programs at NASA Headquarters. Pending selection of the Space Station Program Director, **Bryan O'Connor** has been designated as acting. O'Connor is currently the Director of the Space Station Transition. **Thomas Utsman** is the Space Shuttle Program Director. The present Space Shuttle organizational structure will continue to be responsible for the Space Shuttle Program. [NASA/KSC Release: 93-191, Oct. 20, 1993.]

October 21:

ASRM LOSES IN CONFERENCE

House members of a Congressional conference committee forced Senators to omit funding for the Advanced Solid Rocket Motor (ASRM) in NASA's budget this year. Left in the budget was \$100 million needed to terminate the project. Senator **Howell Heflin** (D-AL) said, "As much as I hate to admit it, the ASRM is dead. There's no question in my mind that the safety of our astronauts and the safety of the Shuttle should dictate the decision that the ASRM be completed." Rep. **George Brown** (D-CA) said, "A very large number of members of Congress are looking for large targets to cut out of the budget so they can demonstrate their commitment to reducing the deficit. ASRM was one of those projects that are fairly large - it would eventually have been \$2-\$3 billion - and whose justification to them was marginal." ["Rocket Project's Fate May Bode Ill for Super Collider," FLORIDA TODAY, p. 6A, Oct. 10, 1993; Eisler, FLORIDA TODAY, p. 1A, Oct. 22, 1993; Camire and Eisler, FLORIDA TODAY, p. 2A, Oct. 23, 1993.]

October 22:

STS 61: ENDEAVOUR IN VAB

The Space Shuttle Endeavour began its rollover to the Vehicle Assembly Building yesterday morning at 10:35 a.m. and, today, the Orbiter has been hoisted from the transfer aisle to the high bay. Today, technicians are busy with mating Endeavour with its external tank. STS 61 work scheduled: electrical and mechanical hookups between Orbiter, mobile launcher platform and other Shuttle elements; interface verification checks; Shuttle interface test and rollout to Launch Complex 39A on October 28, 1993. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 22, 1993.]

II

STS 60: KU-BAND TESTS COMPLETED

In the Orbiter Processing Facility's bay 3, Discovery's Ku-band antenna integrated tests have been completed and the S-band communication system checks are also finished. Work in progress today: main propulsion system leak and functional tests; power reactant storage and distribution system (PRSD) tests; waste

management post-flight servicing; auxiliary power unit (APU) leak and functional tests; elevon flipper door checks; main landing gear wheel, tire assembly and brake replacement; waterproofing of the chin panel. STS 60 work scheduled: removal and replacement of the thruster from the left hand orbital maneuvering system pod; Orbiter/external tank umbilical door cycle checks; water spray boiler checkout and servicing; preparations to install the tunnel adapter; resumption in stacking the right-hand solid rocket boosters in the VAB high bay 3 following the rollover of Endeavour. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 22, 1993.]

October 25: STS 61: ROLLOUT SET FOR OCTOBER 28

In the Vehicle Assembly Building, Endeavour has been lifted and mated to its external tank for the STS 61 mission. Orbiter/external tank mechanical and electrical mates have been completed as well as the demate from the Orbiter transport system (OTS). Currently, technicians are conducting the Shuttle interface verification test and Orbiter/external tank electrical closeouts. STS 61 work scheduled: moving the payload to the launch pad and installing it in the payload changeout room. Rollout to Launch Complex 39A is scheduled for October 28. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 25, 1993.]

October 27: STS 61: SHUTTLE POWER DOWN

In the Vehicle Assembly Building, technicians have completed a manual Shuttle vehicle power down. Endeavour will be powered up again at the launch pad. The Shuttle interface verification test has also been conducted. Work in progress today: preparations for the rollout to Launch Complex 39A; Orbiter/external tank electrical closeouts; transfer of the payload to the payload changeout room at LC 39A. STS 61 work scheduled: rollout to LC 39A at 4 a.m. October 28; launch pad validations with a hot firing of the auxiliary power units; place rotating service structure around the Orbiter October 29. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 27, 1993; Banke, FLORIDA TODAY, p.2A, Oct. 28, 1993.]

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STS 60: APU TESTS

In Orbiter Processing Facility bay 3, workers have completed auxiliary power unit (APU) leak and functional tests; they have tested and replaced thrusters and have made Orbiter/external tank umbilical door cycle checks. Work in progress today: water spray boiler checkout and servicing; S-Band communication system checks; main propulsion system leak and functional tests; preparations to install the tunnel adapter; waste management post-flight servicing; stacking the right-hand solid rocket boosters in the VAB's high bay 3. STS 60 work scheduled: installation

of the tunnel adapter; preparations to re-install the forward reaction control system; integrated drag chute installation. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 27, 1993.]

October 28: ENDEAVOUR ROLLS TO LC 39A

"The move is one of the last major milestones before launch," said KSC spokesman **Bruce Buckingham** about Endeavour's rollout to Launch Complex 39A this morning. The six-hour journey began at 3:21 a.m. and inched along the 3 1/2-mile crawlerway at a stately 1 mile per hour pace. The Orbiter's STS 61 mission will carry a corrective lens for the Hubble Space Telescope into orbit. The crew includes: Commander **Richard Covey**, Pilot **Ken Bowersox**, Payload Commander **Story Musgrave** and Mission Specialists **Tom Akers**, **Jeffrey Hoffman**, **Claude Nicollier** and **Kathryn Thornton**. [Halvorson, FLORIDA TODAY, p. 2A, Oct. 29, 1993.]

October 29: STS 61: APUS HOT FIRED

Endeavour was hard down on the pad at Launch Complex 39A at about 10 a.m. yesterday. The vehicle has been secured to the pad and the crawler transporter has been removed. The ground power source to the vehicle was secured and the Orbiter was powered up. Technicians then conducted a successful hot firing of auxiliary power units 1, 2 and 3. Work in progress today: placing the rotating service structure around the vehicle; launch pad validations and pad/shuttle interface checks and opening of the payload bay doors. STS 61 work scheduled for next week: final payload bay cleaning prior to payload installation; installation of the IMAX camera and ICBC payloads into the Orbiter; installation of the primary payloads into the payload bay; payload interface verification checks and end-to-end tests; helium signature test; preparations for hypergolic reactant loading onto the vehicle; terminal countdown demonstration test with crew arrival November 3 and T-0 on November 5. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 29, 1993.]

[] STS 60: TESTS AND LEAK CHECKS

Discovery is in OPF bay 3 where it is being prepared for its STS 60 mission. S-band communication system checks have been completed. Technicians preparing the vehicle for rollover to the Vehicle Assembly Building have also completed Orbiter/external tank umbilical door cycle checks; test and leak check replaced thrusters and finished auxiliary power unit leak and functional tests. Work in progress today for the STS 60 mission: rudder speed brake and body flap checks; raising the nose landing gear; preparations to install the tunnel adapter; payload bay cleaning prior to installation of the tunnel adapter; water spray boiler checkout and servicing; integrated drag chute installation; stacking right-hand solid rocket

boosters in VAB high bay 3; preparations to replace a thruster. STS 60 work scheduled for next week: replacing the thruster on the OMS pod; main propulsion system leak and functional tests; installation of the tunnel adapter; preparations to install the forward reaction control system (FRCS); transfer FRCS to OPF for installation on Orbiter and interface verification checks; Orbiter/external tank umbilical door closeouts; radiator mechanical functional checks; preparations to install SPACEHAB; preparations to transfer the Wake Shield Facility to the vertical processing facility. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Oct. 29, 1993.]

November

November 1: STS 58: COLUMBIA LANDS AT EDWARDS

Columbia landed successfully and on time today at Edwards Air Force Base, California. This ends the longest Space Shuttle mission to date. The Orbiter and crew landed on orbit 225 on concrete runway 22. Approximate mission elapsed times are as follows:

Main gear touchdown:	14:00:12.32 (10:05.42 EST)
Nose gear touchdown:	14:00:12.44 (10:05.54 EST)
Wheel stop:	14:00:13.34 (10:06.44 EST)
Mission duration:	14 days/13 minutes

Current plans call for Columbia to begin its two-day ferry flight back to KSC on November 7, with an arrival at Kennedy Space Center on November 8. The STS 58 crew included: Commander **John Blaha**; Pilot **Richard Searfoss**; Mission Specialists **Rhea Seddon**, **Bill McArthur**, **David Wolf**, **Shannon Lucid**; Payload Specialist: **Martin Fettman**. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Nov. 1, 1993; KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Nov. 2, 1993; Date, THE ORLANDO SENTINEL, pp. A-1 & A-6, Nov. 2, 1993.]

II

STS 61: PAYLOAD BAY DOORS OPEN

Technicians at Launch Complex 39A have now opened Endeavour's payload bay doors and have installed the IMAX camera and the ICBC payloads. The rotating service structure has been placed around the Orbiter; launch pad validations and pad/Shuttle interface checks have been completed. Pre-launch tasks in process today: final payload bay/payload changeout room cleaning prior to payload installation; preparations for the helium signature test; preparations for hypergolic reactant loading onto Endeavour. STS 61 tasks scheduled: installation of payloads; payload interface verification checks and end-to-end tests; helium signature test; terminal countdown demonstration test. The STS 61 crew is expected to arrive tomorrow. The crew includes: Commander **Richard O. Covey**, Pilot **Kenneth Bowersox**, Mission Specialists. **Story Musgrave**, **Thomas D. Akers**, **Jeffrey A. Hoffman**, **Kathryn C. Thornton**, **Claude Nicollier**. Payload: Hubble Space Telescope optical correction, SM-1, ICBC. The target launch date for STS 61 is December 1. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Nov. 1, 1993; Banke, FLORIDA TODAY, Nov. 21, 1993.]

II

STS 60: DRAG CHUTE INSTALLED

Discovery continues to undergo processing activities while in Orbiter Processing Facility bay 3 for its next mission: STS 60. Workers have completed the following tasks: rudder speed brake and body flap checks; raising the nose

landing gear; replacing an OMS pod thruster; integrated drag chute installation. Work in progress today: preparations to install the tunnel adapter; payload bay cleaning prior to installation of the adapter; water spray boiler checkout and servicing; stacking right-hand solid rocket boosters in the Vehicle Assembly Building's high bay 3. STS 60 work scheduled: main propulsion system leak and functional tests; installation of the tunnel adapter; preparations to install the forward reaction control system (FRCS); transfer the FRCS to OPF for installation on Discovery and interface verification checks; Orbiter/external tank umbilical door closeouts; preparations to install Spacehab; preparations to transfer Wake Shield Facility to the Vertical Processing Facility. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Nov. 1, 1993.]

NOVEMBER 2: STS 58: LANDING UPDATE

Preliminary post-flight inspections revealed a total of 68 dings to Columbia's Thermal Protection System tiles, with 23 of these dings being one inch or greater in size. A 40-inch section of thermal barrier was torn around the heat shield area of one of the main engines. The cause of this tear is still unknown and will be examined upon the Orbiter's return to Kennedy Space Center. Current plans call for Columbia to begin its two-day ferry flight from California back to KSC on November 7, with arrival at the space center on November 8. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, November 2, 1993.]

[] STS 61: PAYLOAD CHANGEOUT ROOM CONTAMINATION

Installation of the STS 61 payloads into the Orbiter Endeavour has been put on indefinite hold due to some contamination that was recently discovered inside the launch pad's payload changeout room. A very fine sandy substance appeared in the changeout room last weekend. It is believed to have been caused by a windy weather system that recently passed through Central Florida. The changeout room was subsequently cleaned but a smaller amount of the debris was detected late Sunday. No single area has been found to be the sole source of the contamination, but the debris may be associated with recent sandblasting operations at Launch Complex 39A. Shuttle management has formed four teams to investigate the matter and to address any schedule changes that may be necessary. The rotating service structure has been placed around Endeavour. Launch pad validations and pad/Shuttle interface checks are complete. The payload bay doors have been opened and the IMAX camera and ICBC payloads installed. Work in progress today: preparations for the terminal countdown demonstration test, the helium signature test and for hypergolic reactant loading onto the Orbiter. STS 61 work scheduled: helium signature test, the TCDT and crew arrival on November 4. KENNEDY SPACE CENTER SPACE SHUTTLE

STATUS REPORT, Nov. 2, 1993; Halvorson, **FLORIDA TODAY**, pp. 1A-2A, Nov. 3, 1993.]

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STS 60: OMS POD THRUSTER REPLACED

In OPF bay 3, one of Discovery's OMS pod thrusters has been replaced. In addition, rudder speed brake and body flap checks have been finished. The nose landing gear has been raised and integrated drag chute installation is complete. Work in progress today: preparations to install the tunnel adapter; payload bay cleaning prior to installation of tunnel adapter; water spray boiler checkout and servicing; stacking right-hand solid rocket boosters in Vehicle Assembly Building high bay 3. STS 60 work scheduled: main propulsion system leak and functional tests; installation of the tunnel adapter; preparations to install the forward reaction control system (FRCS); transfer of the FRCS to the OPF for installation on Discovery and interface verification checks; Orbiter/external tank umbilical door closeouts; preparations to install SPACEHAB; Wake Field Facility to be moved to the Vertical Processing Facility tomorrow. **[KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Nov. 2, 1993.]**

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TITAN LAUNCH DELAYED

The upcoming Titan 4 launch has been delayed indefinitely so that a potentially explosive booster segment can be replaced. Air Force launch managers will decide within two weeks whether the changeout work can be done at the pad, according to spokeswoman **Terri Bracher**. If the work cannot be done there, the Titan will be returned to the vertical assembly building. An August 2 launch failure at Vandenberg AFB (CA) made the Titan 4 now at its pad suspect to managers. The California failure has been traced to an improperly repaired booster segment; the explosion destroyed an \$800 million group of ocean surveillance satellites. **John Pike**, Director of Space Policy for the Federation of American Scientists, said: "The Titan has turned out to be a surprisingly unreliable vehicle. They shouldn't be having these problems. There's just no excuse for it." [Halvorson, **FLORIDA TODAY**, Nov. 3, 1993.]

November 3:

STS 61: POSSIBLE PAD MOVE

In light of the contamination at Launch Complex 39A's payload changeout room (PCR), the decision has been made to remove the HST payload from LC 39A's PCR and return it to the Payload Hazardous Servicing Facility (PHSF) for further cleanliness inspections. Current projections indicate the payload will remain at the PHSF for about 10 days. Tonight, the payload canister will be transported to the pad and, on November 5, the move to the PHSF will occur. For this, the rotating service structure will be retracted this afternoon and remain in the park position throughout the terminal countdown demonstration test (TCDT). Also, managers

are currently working to preserve options to launch STS 61 from either pad. A decision is expected by the end of the week. There has been no impact to the targeted launch date. Endeavour's payload bay doors have been closed and the helium signature test has been completed. Work in progress: payload changeout room cleaning and inspections; securing aft engine compartment and installation of aft doors; retracting the rotating service structure from around the vehicle; preparations to return the primary HST payload to the PHSF. STS 61 work scheduled: return the payload to the PHSF for cleanliness inspections; terminal countdown demonstration test, ending at 11 a.m. November 5; preparations for hypergolic reactant loading onto the Orbiter. [**KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT**, Nov. 3, 1993.]

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STS 60: PAYLOAD BAY CLEANING

Discovery has had its payload bay cleaned while undergoing pre-rollover processing in the OPF bay 3. The FRCS has been transferred to the OPF and preparations have been made to install the tunnel adapter in the vehicle. Work in progress today: body flap actuator checks; Orbiter/external tank umbilical door closeouts; main propulsion system leak and functional tests; install the tunnel adapter; preparations to install the forward reaction control system (FRCS); water spray boiler checkout and servicing; payload interface checks; stacking right-hand solid rocket boosters in the Vehicle Assembly Building high bay 3. STS 60 work scheduled: installing FRCS and interface verification checks; checks on Orbiter door radiators; preparations to install SPACEHAB, preparations to transfer Wake Shield Facility to the Vertical Processing Facility. Current plans call for Columbia, just returned from its STS 58 mission, to begin its two-day ferry flight back to Kennedy Space Center on November 7. Arrival will be the following day, barring weather problems. All work is continuing as planned on the vehicle which is currently in the mate/demate device. Experiment destow is complete. [**KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT**, Nov. 3, 1993.]

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SHUTTLE TO MAKE 10 MIR TRIPS

The new cooperative ventures in space with Russia means that there will be at least 10 Space Shuttle missions to the Russian Space Station Mir according to plans the Clinton White House will reveal today. Congressman **Jim Bacchus** said the agreement will impact the Kennedy Space Center in two important ways: "Shuttles launched from KSC will carry all U.S. hardware to NASA's proposed International Space Station, which Russia will join as a full partner; Shuttles will remain the primary vehicle for ferrying supplies to the station." Bacchus added, "That's big news for Brevard County. This gives us assurances of full use of the Space Shuttle over the next few years, and that's extraordinarily important." The increases in numbers of missions are an elaboration of the planned mission next

year with Russia's **Sergei Krikalev** and the first Shuttle mission to Mir in 1995. [Halvorson, FLORIDA TODAY, Nov. 4, 1993; Elder, FLORIDA TODAY, pp. 1A-2A, Nov. 5, 1993; "Pact Pushes U.S., Russia As Comrades In Space," THE ORLANDO SENTINEL, pp. A-1 & A-4, Nov. 5, 1993.]

November 4:

MUSICAL PADS?

No decision has been made yet as to which pad mission STS 61 will be launched from. The concern is over sandblast grit found in Launch Complex 39A's payload changeout room (PCR). Because of the potential for contamination, the HST payloads will be removed from the PCR and returned to the Payload Hazardous Servicing Facility (PHSF) for further cleanliness inspections. Also, the PCR at LC 39A will be cleaned and the PCR's at both pads reinspected. The payload transport canister was delivered to Pad A last night and operations to install the payloads into the canister are in work today. Early tomorrow morning the canister will leave the pad and be transported to the PHSF. Managers are still working to preserve options to launch STS 61 from either pad. A decision is expected by the end of the week.

The rotating service structure has been retracted from around Endeavour. The aft engine compartment has been secured and the aft doors installed. Work in progress today includes: the terminal countdown demonstration test which ends at 11 a.m. November 5; payload changeout room cleaning and inspections; installation of the primary HST payloads into the transport canister; preparations to return payloads to the PHSF. STS 61 work scheduled: returning the payloads to the PHSF for cleanliness inspections and preparations for hypergolic reactant loading onto Endeavour. [**KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT**, Nov. 4, 1993.]

II

TCDT TODAY FOR ENDEAVOUR

While NASA managers are deciding whether to keep the Space Shuttle Endeavour at Launch Complex 39A or move it to 39B, the Orbiter itself and, in the latter stages its seven member crew, will undergo the mission's terminal countdown demonstration test. The test gets underway at 8:00 a.m. this morning and runs through tomorrow morning. Endeavour's prime payload for its STS 61 mission, the Hubble Space Telescope's replacement instruments, will be moved November 5 to a KSC satellite processing facility for examination and cleaning, if necessary.

Installation in Endeavour's cargo bay is expected to occur November 16 to stay on schedule for the expected December 1 launch. Columbia, in California at Edwards Air Force Base, is being readied for its ferry flight back to Kennedy Space Center; it should arrive at KSC early Sunday, November 6. [Halvorson, FLORIDA TODAY, Nov. 4, 1993; Halvorson, FLORIDA TODAY, Nov. 5, 1993.]

STS 60: WAKE SHIELD FACILITY TO VPF

The Wake Shield Facility, scheduled to fly into space aboard Discovery, has been transferred to the Vertical Processing Facility. The forward reaction control system (FRCS) has been transferred to the Orbiter Processing Facility. The Orbiter's tunnel adapter has been installed and workers have made Orbiter/external tank umbilical door closeouts. STS 60 work in progress: body flap actuator checks; tunnel adapter/crew module leak checks; main propulsion system leak and functional tests; preparations to install the forward reaction control system (FRCS); water spray boiler checkout and servicing; payload interface checks; stacking right-hand solid rocket boosters in the Vehicle Assembly Building's high bay 3. STS 60 work scheduled: installation of the FRCS and interface verification checks; checks on Orbiter door radiators; preparations to transport SPACEHAB to OPF and install it in the Orbiter's payload bay. [**KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT**, Nov. 4, 1993.]

November 5:

STS 61: ENDEAVOUR TO SWITCH PADS

Managers decided today to move the Space Shuttle Endeavour and the HST service mission from Launch Complex 39A to Launch Complex 39B. KSC spokesman **Bruce Buckingham** said today, "It's going to chew up all our contingency time except for a few days around the Thanksgiving holidays." Contamination found in pad A's payload changeout room (PCR) as a result of last weekend's high winds demonstrated additional measures were required to insure protection for the Hubble Space Telescope (HST) instruments. Managers are certain that the required recertification of the pad A PCR is achievable, however, the normal vehicle processing activities may conflict with the recertification schedule. Some standard post-launch work at pad B remains to be accomplished, including recertification of the PCR. Additionally, the pad B PCR will be modified to enhance the integrity of the facility. This work includes modifying and sealing the ceiling for added protection.

The Endeavour vehicle will remain at pad A and continue its routine processing activities, including hypergolic propellant loading, until pad B is ready to accept the vehicle. This decision allows the pad B PCR activities to proceed in parallel with the Shuttle processing on pad A, thus providing the best opportunity for meeting the target launch date. The earliest move to pad B is expected to occur approximately November 15 with no impact to target launch date of December 1. The HST payloads were transported there last night from pad A to the canister rotation facility. There, the canister will be placed in a horizontal position. Later today, with the payloads still inside, the transport canister will be moved to the Payload Hazardous Servicing Facility (PHSF) for further cleanliness inspections. The HST instruments will likely be moved to pad B about November 15. The STS 61 mission's terminal countdown demonstration test was completed today at

11 a.m. The primary HST payloads were installed into the transport canister and moved to the Payload Hazardous Servicing Facility. Work in progress today includes: extending the rotating service structure around the vehicle; payload changeout room cleaning and inspections; removal of the aft compartment doors; preparations for hypergolic reactant loading onto the vehicle. The hypergolic fuels will be loaded onto the Orbiter next week. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Nov. 5, 1993; Halvorson, FLORIDA TODAY, p. 1A, Nov. 6, 1993; "Endeavour's Launch Pad Switch Won't Delay Mission," THE ORLANDO SENTINEL, Nov. 6, 1993.]

II STS 60: TUNNEL ADAPTER INSTALLED

Discovery's tunnel adapter has been installed and payload bay radiator functional checks have been completed in preparation for the vehicle's STS 60 mission. Current processing tasks include: body flap actuator checks; tunnel adapter/crew module leak checks; installation of the 'D' hatch; main propulsion system leak and functional tests; water spray boiler servicing and decay leak checks; stacking right-hand solid rocket boosters in the Vehicle Assembly Building high bay 3; installation of the Wake Shield Facility into the Vertical Processing Facility high bay. Work schedule for next week: installation of the forward reaction control system (FRCS) and interface verification checks; checks on the Orbiter door radiators; orbital maneuvering system flight control verifications; preparations to transport SPACEHAB to the Orbiter Processing Facility (OPF) and install it in Discovery's payload bay; Wake Shield Facility interface verification checks. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Nov. 5, 1993.]

II STS 58: COLUMBIA'S RETURN

Current plans call for Columbia to begin its two-day ferry flight back to KSC on November 7, with arrival at Kennedy Space Center on November 8, if weather en route permits. All work is continuing as planned on the vehicle which is currently in the mate/demate device. Ferry kit installation operations is in work. The vehicle will be mated to the Shuttle Carrier Aircraft (SCA) this weekend. Once at KSC, the Orbiter will be towed and placed inside OPF Bay 2 for processing of its next mission, STS 62. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Nov. 5, 1993.]

II KSC IMPACT ON FLORIDA ECONOMY

Space related employment and contracts at NASA's Kennedy Space Center yielded a \$1.519 billion boost to Florida's economy during the 1993 fiscal year which ended September 30. This represents an increase of about \$32 million over the previous year. Of KSC's expenditures, \$1.230 billion went to contractors

operating on-site at the space center. An additional \$96.8 million went to off-site businesses in Brevard County. Other purchases and contracts awarded to Florida businesses outside Brevard County totaled about \$62.4 million. Space center purchases and contracts to businesses outside Florida totaled about \$63.5 million.

Civil service salaries and personnel benefits through the end of fiscal year 93 amounted to \$157.3 million, an increase of about \$4.7 million over last year. About \$129.6 million was for regular salary, lump-sum payments, overtime and awards programs. The remaining \$27.6 million went for additional personnel benefits. (The \$27.6 million civil service benefits package and \$63.5 million in out of state business awards increased KSC's total spending during the year to \$1.610 billion.) Permanent federal employees at KSC totaled 2,631 during the same period. While 3,902 people were employed through construction and tenant jobs at KSC, the majority of the workers were employed by the on-site contractors and numbered almost 11,720. Overall, approximately 18,253 workers were employed at KSC through the close of the Fiscal Year on September 30. Major contractors at Kennedy Space Center include Lockheed Space Operations, Co., the Shuttle Processing Contractor; EG&G Florida, Inc., the Base Operations Contractor; McDonnell Douglas Aerospace KSC Division, the Payload Ground Operations Contractor; and Rockwell International Corp., the Shuttle Orbiter logistics support contractor. [NASA/KSC Release No. 142-93, Nov. 5, 1993.]

November 6:

KSC OPEN HOUSE

Kennedy Space Center opened its doors wide to employees and their families today from 9:00 a.m. until 3:00 p.m. "This is really a great opportunity. This really gets the public up close to the space program. It gets you excited and makes you want to support the program," said **Jeff Sager**, whose family members were guests of KSC employee **Bob Springer**. Visitors were able to drive around Launch Complex 39A where Endeavour awaits its STS 61 mission launch and to see the Launch Control Center and Orbiter Processing Facility. The KSC Headquarters Building and Operations & Checkout Building were also open to the public. [Halvorson, FLORIDA TODAY, p.1B, Nov. 7, 1993.]

November 7:

INTERNATIONAL SPACE STATION

The heads of the space agencies involved in the International Space Station, met in Montreal, Canada, today. The participants included NASA, the Canadian Space Agency (CSA), the European Space Agency (ESA), and the National Space Development Agency of Japan (NASDA), together with the head of the Russian Space Agency (RSA). Their joint statement follows:

Pursuant to the Joint Statement on potential Russian involvement in the Space Station issued by the United States, Canada, Japan and the Member States of the

European Space Agency on October 16, 1993, the heads of the space agencies involved in the International Space Station, the Canadian Space Agency (CSA), the European Space Agency (ESA), the National Space Development Agency of Japan (NASDA) and the United States National Aeronautics and Space Administration (NASA), together with the head of the Russian Space Agency (RSA), met in Montreal, Canada, on November 7, 1993. This was the first collective meeting of the Space Station partners with Russia, which is a significant step in the consideration of broadening the International Space Station partnership. The heads of agencies reviewed the outcome of the joint NASA/RSA studies conducted over the last several months and reflected in the Addendum to the Space Station Alpha Program Implementation Plan of November 1, 1993, and discussed the possible participation of Russia as a partner in the International Space Station.

Such a project would be the largest undertaking in history, bringing together the combined space efforts of Canada, Europe, Japan, Russia and the United States. The CSA, ESA and NASDA expressed their appreciation for the information provided in the Addendum, which outlines an enhanced program that could lead to a more robust and reliable International Space Station that would benefit all the partners. They also expressed their appreciation for the efforts undertaken by NASA and RSA in producing this Addendum and welcomed the additional information provided at this meeting. The heads of agencies noted that Phase 1 involving the Space Shuttle and the MIR station, with its attendant science, technology and operations activities, offers an early opportunity for learning and experience. This Phase is intended to greatly reduce the risks for all of the partners during the combined Phase 2/Phase 3 activities to construct, operate and utilize the International Space Station. The head of the RSA expressed to his counterparts Russia's firm desire to participate as a partner, contributing additional capabilities and resources, whilst acknowledging the attendant obligations and responsibilities it would undertake as a full partner. Recognizing the benefits to be gained, CSA, ESA, NASDA and NASA agreed on the need to complete an intense process at all levels that could lead to Russia becoming a full partner in the International Space Station. [NASA/KSC NOTE TO EDITORS: N93-62, Nov. 8, 1993; Stinson, FLORIDA TODAY, p.1A, Nov. 5, 1993; "Space Partnership Should Protect Jobs," FLORIDA TODAY, Nov. 14, 1993.]

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TBS PLANS SPACE MINISERIES

A four-hour television miniseries on the history of the space program is being made by Turner Broadcasting Service, and producers are looking to Brevard County residents for help with the project. "For the series we are very interested in obtaining photographs and home movies from people who worked on the space program or who lived near NASA facilities," associate producer **Daniel Levitt** said. The video project will be based loosely on a book to be published next summer

by Brevard residents **Howard Benedict** and **Jay Barbree**. "Our project will tell the story from the astronauts' and insiders' perspective," said Levitt. "Anecdotal images from people who were there at the time will be invaluable in helping us tell the behind the scenes story of NASA's tremendous achievement." Levitt said the series will air in late 1994 as part of the activity commemorating the 25th anniversary of the Apollo 11 moon landing. TBS's companion network - Turner Network Television - is planning a documentary on Apollo 11 to be broadcast in July 1994. Merritt Island resident **Nancy Yasecko**, of Varied Productions, planned research in January 1994, in the Kennedy Space Center Library Archives as part of her work on the anniversary production. ["TBS Plans Miniseries on NASA," FLORIDA TODAY, p. 10E, Nov. 7, 1993.]

November 8:

COLUMBIA RETURNS TO KSC

Bascom Murrah, Processing Manager for the Space Shuttle Columbia, said today: "You know, they say the older the violin, the sweeter the music. Well, [Columbia's] the queen of the fleet." Launch Director **Robert B. Sieck** said, "We're happy to get the bird back and looking forward to go fly it again next year." The oldest Shuttle, Columbia, returned to KSC where more than two weeks ago it was launched on a record 14-day stay in space. The Orbiter attached to its 747 Shuttle Carrier Aircraft landed on the Shuttle Landing Facility shortly before 11 a.m. EST. [Halvorson, FLORIDA TODAY, p. 1A, Nov. 8, 1993; Banke, FLORIDA TODAY, p. 1A, Nov. 9, 1993.]

November 9:

MORE ON SHUTTLE MOVE

Managers decided last Friday (November 5) to move the Shuttle Endeavour and the HST service mission from LC 39A to LC39B. Contamination found in pad A's payload changeout room (PCR) as a result of last weekend's high winds demonstrated additional measures were required to insure protection for the HST instruments. Managers are certain that the required recertification of the pad A PCR is achievable, however, the normal vehicle processing activities may conflict with the recertification schedule. Some standard post-launch work at pad B remains to be accomplished, including recertification of the PCR. Additionally, the pad B PCR will be modified to enhance the integrity of the facility. This work includes modifying and sealing the ceiling for added protection. The Endeavour vehicle will remain at pad A and continue its routine processing activities, including hypergolic propellant loading, until pad B is ready to accept the vehicle. This decision allows the pad B PCR activities to proceed in parallel with the Shuttle processing on pad A, thus providing the best opportunity for meeting the target launch date. Endeavour may be moved to pad B as early as this Monday (November 15), with no impact expected to a target launch date of December 1. The terminal countdown demonstration test is scheduled for November 12. Foaming of the solid rocket boosters' aft skirt trailing edge has

been completed. Turbopumps on both Endeavour and Discovery will be inspected because of problems found with a test engine at Rocketdyne's Canoga Park factory. At the factory, a tiny crack was found in a titanium inlet that feeds liquid hydrogen into a main engine's high-pressure fuel turbopump.

Work in progress today in behalf of the STS 61 mission: pad B payload changeout room cleaning and inspections; cleaning of pad B in preparation of the arrival of Endeavour at the pad; preparations for hypergolic reactant loading onto the Orbiter; loading of hypergolic reactant fuels beginning late today. STS 61 work scheduled: inspections of engine fuel pumps; moving the Orbiter to pad B as early as November 15; replacement of protective cover on the Hubble Space Telescope payloads and transport of the payloads to Launch Complex 39B November 15. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Nov. 9, 1993; Halvorson, FLORIDA TODAY, pp. 1A-2A, Nov. 10, 1993.]

II

STS 60 & 58: UPDATES

Workers in OPF Bay 3 have installed the tunnel adapter in Discovery and made payload bay radiator mechanical functional checks. They have also conducted the interface verification test of the Wake Shield Facility. Current STS 60 tasks: body flap actuator checks; tunnel adapter/crew module leak checks; flight control aerosurface checkouts; main propulsion system leak and functional tests; preparations to install the forward reaction control system (FRCS) and stacking right-hand solid rocket boosters in the Vehicle Assembly Building's high bay 3. STS 61 work scheduled: installation of the FRCS and implementation of the interface verification checks; checks on the Orbiter door radiators; orbital maneuvering system flight control verifications; preparations to transport the SPACEHAB to the Orbiter Processing Facility and install it in Discovery's payload bay on November 15. Meanwhile, Columbia and its 747 Shuttle Carrier Aircraft landed at KSC's Shuttle Landing Facility at 10:56 a.m. The duo left Edwards Air Force Base, California, November 7 and remained overnight at Columbus Air Force Base, Mississippi, before moving on to Kennedy Space Center. Columbia was demated from its 747 carrier aircraft and has been moved to OPF bay 2 where it will be deserviced from STS 58 and readied for its next mission, STS 62. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Nov. 9, 1993.]

November 10:

STS 61: TURBOPUMP INSPECTIONS

Precautionary inspections of Endeavour's three main engine high pressure fuel turbopumps will begin this week. Officials want to be certain that there are no imperfections in the pumps. Some minor discoloration and tiny cracks were recently observed inside a test pump at the Rocketdyne manufacturing plant in

California. Hypergolic oxidizer propellants have been loaded onto Endeavour. Current processing tasks include: pad B payload changeout room cleaning and inspections; preparations to inspect the turbopumps; loading of hypergolic propellants and the Kennedy Space Center Launch Readiness Review. STS 61 work scheduled: inspections of the engine fuel pumps; moving the Orbiter to pad B on November 15; replacement of a protective cover on the Hubble Space Telescope payloads and transportation of the payloads to LC 39B on the 15th. **[KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Nov. 10, 1993; "Test Engine Crack Spurs Inspection of Endeavour," THE ORLANDO SENTINEL, Nov. 10, 1993.]**

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STS 60 & COLUMBIA UPDATES

The interface verification test of the Wake Shield Facility has been completed; the facility is the prime payload of Discovery on its next mission, STS 60. Technicians in OPF bay 3 have also conducted flight control aerosurface checkouts. Current tasks include: tests of the Orbiter/payload interfaces; tunnel adapter/crew module leak checks; main propulsion system leak and functional tests; preparations to install forward reaction control system (FRCS) and stacking right-hand solid rocket boosters in the Vehicle Assembly Building's high bay 3. STS 60 work scheduled: installation of the FRCS and interface verification checks; orbital maneuvering system flight control verifications; preparations to transport SPACEHAB to the OPF and install it in Discovery's payload bay on November 15. **[KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Nov. 10, 1993.]**

November 11: ENDEAVOUR'S PUMPS TESTED TODAY

"We finished all the pump inspections [of Endeavour] and they were all good," said Rocketdyne's **John Plowden**. "I was very confident that we wouldn't find anything, but we went ahead and looked anyway. It's a critical part, and safety is first." Discovery had two of its three turbopumps inspected as well and, like Endeavour, no defects were found. Tiny cracks found on other pumps at the Rocketdyne Canoga Park manufacturing site led to the inspections. Malone went on to say, "We have no reason to suspect we have a problem with the pumps at the pad. This is just a precautionary check to make sure there are no discrepancies." [Halvorson, FLORIDA TODAY, p. 3A, Nov. 11, 1993; Halvorson, FLORIDA TODAY, p. 1A, Nov. 12, 1993.]

November 12: STS 61: TURBOPUMPS READY FOR FLIGHT

Endeavour's turbopumps have been inspected and found to have no discrepancies; they are ready for the launch of STS 61. "We finished all the pump inspections (on Endeavour) and they were all good. I was very confident that we wouldn't

find anything, but we went ahead and looked anyway. It's a critical part, and safety is first," commented **John Plowden**, Rocketdyne's Site Director at Kennedy Space Center. Hypergolic propellants have been loaded onto the Orbiter. Work currently in progress: helium signature leak test of the main engine fuel systems; pad b payload changeout room cleaning and inspections; preparations to transfer Endeavour to Launch Complex 39B and preparations to replace auxiliary power unit controller 2. STS 61 work scheduled for next week: moving the vehicle; replacing protective covers on the HST payloads; payloads to be transported to LC 39B at midnight November 15; installation of the payloads on November 19 and a Flight Readiness Review on November 17. Launch is targeted for 4:57 a.m. EST on December 1 and landing is expected to occur at 3:33 a.m. on December 12 EST. The launch window is one hour, 11 minutes in duration. [**KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT**, Nov. 12, 1993; Halvorson, FLORIDA TODAY, Nov. 12, 1993.]

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STS 60: FRCS INSTALLED

Discovery's forward reaction control system has been installed and the flight control aerosurface checkouts are now completed. Technicians in the OPF's bay 3 have also conducted the interface verification test of the Wake Shield Facility. Current processing activities include: tests of the Orbiter payload interfaces; preparations to install the SPACEHAB payload; transfer of the SPACEHAB to the OPF; servicing the Orbiter with ammonia and stacking right-hand solid rocket boosters in the Vehicle Assembly Building high bay 3. Work scheduled for next week: electrical verifications of the forward reaction control system; installation of SPACEHAB in the Orbiter's payload bay and installation of Discovery's three main engines. Post-flight processing of Columbia after its successful STS 58 mission continues. Current activities: removal of the tail cone; installation of strongbacks on the payload bay doors; opening the payload bay doors and post-flight inspections. Next week, technicians will remove the Spacelab Life Sciences payload from Columbia's cargo bay. [**KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT**, Nov. 12, 1993.]

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ENDEAVOUR PASSES HELIUM TEST

Endeavour successfully underwent a vital test of its main propulsion system today when engineers passed gaseous helium through parts of the Orbiter's system to check on the possible existence of leaks. Kennedy Space Center spokeswoman **Lisa Malone** said, "We're making headway." A similar test had been conducted earlier in the month; since that time the engines had been inspected and launch managers ordered the retest to assure that no leaks had been introduced during the inspections. An APU controller will be replaced and will be retested. The launch target date remains December 1. [Halvorson, FLORIDA TODAY, p. 2A, Nov. 13, 1993; Halvorson, FLORIDA TODAY, Nov. 14, 1993.]

November 14:

SILVER SNOOPYS AWARDED

Seven civil service employees were recently honored with the prestigious astronaut award, the Silver Snoopy: **Paul Kilpatrick** (Titusville, FL) a safety engineer with the Safety, Reliability and Quality Assurance Directorate; **Howard "Bird" Schinzielorz** (Palm Bay, FL), a fluids test engineer with the Shuttle Management and Operations Directorate; **Martha Williams** (Port St. John, FL) a materials engineer with the Engineering Development Directorate; **Frank Der** (Cocoa, FL) also with the Engineering Development Directorate; **Elizabeth Brown** (Orlando, FL) of the Procurement Office; **Christopher Sigg** (Titusville, FL) of the Center Support Operations Directorate, and **Nora Ross** (Titusville, FL), secretary and personal assistant to the Director of Shuttle Operations in the Shuttle Management and Operations Directorate. ["NASA, KSC Workers Earn Silver Snoopys," FLORIDA TODAY, p. 9E, Nov. 14, 1993.]

II

COMPANIES WIN KSC AWARDS

Eight contractors at Kennedy Space Center were recently recognized for outstanding performance in the past year:

COMPANY NAME	LOCATION	CATEGORY
Lockheed Space Operations Company	Titusville, FL	Large Business Contractor
Watson Paving, Inc.	Cocoa, FL	Small Business Contractor
Hernandez Engineering, Inc.	Houston, TX	Small Disadvantaged Business Contractor
Analex Space Systems, Inc.	Titusville, FL	Woman-Owned Small Business Contractor
V. A. Paving, Inc.	Cocoa, FL	Woman-Owned Small Business Contractor
Amertron, Inc.	Melbourne, FL	Small Business Contractor
United Services Associates, Inc.	Kennedy Space Center, FL	Small Disadvantaged Business Subcontractor
High Purity Systems, Inc.	Titusville, FL	Woman-Owned Small Business Subcontractor

["Area Companies Win KSC Awards," FLORIDA TODAY, p. 10E, Nov. 14, 1993.]

November 15:

PAD SWITCH ON FOR TODAY

"It's not something we plan on doing normally, but in this particular case, it works to our advantage," said **Lisa Malone**, KSC spokeswoman. Malone was referring to today's move of Endeavour from Launch Complex 39A to Launch Complex 39B. The move is aimed to keep the space center on track for launching STS 61 on its target date of December 1, 1993. The move begins at noon today and is expected to take some five hours to complete. [Halvorson, FLORIDA TODAY, p. 4A, Nov. 14, 1993; Halvorson, FLORIDA TODAY, p. 1A, Nov. 15, 1993.]

II

ENDEAVOUR STILL ON SCHEDULE

"We're in good shape," said Kennedy Space Center spokesman **Bruce Buckingham**. "We're still on schedule." Buckingham was referring to NASA's target launch date of December 1 for Endeavour's STS 61 mission. The move to pad B was successful; the HST payload was cleaned over the past weekend and coverings of the payload which had been sprinkled by sand have now been replaced. The pad switch for Endeavour was the second such switch in the history of the Space Shuttle program at KSC. In 1990, Columbia was moved from pad A to B to make room at LC 39A for Atlantis. [Halvorson, FLORIDA TODAY, p. 2A, Nov. 16, 1993; "Endeavour Makes Move to Different Launch Pad," THE ORLANDO SENTINEL, Nov. 16, 1993.]

II

ENDEAVOUR UPDATE

Work is in progress today to move the Space Shuttle Endeavour and the Hubble Space Telescope service mission from pad 39A to pad 39B. Contamination found in pad A's payload changeout room (PCR) as a result of high winds in late October demonstrated additional measures were required to insure protection for the HST instruments. No impact to a target launch date of December 1 is anticipated. The firm launch date will be set at the Flight Readiness Review scheduled for this Wednesday (November 17). The HST payloads will be transported to pad B tonight. They will be installed into the PCR at pad B tomorrow.

Pre-roll preparations have been made; the rotating service structure was retracted today, beginning at about 9 a.m. The HST payloads have been transferred from the Payload Hazardous Servicing Facility to the canister rotation facility for rotation to a vertical position. Pad B cleaning and inspections have been completed along with the fuel side of the vehicle helium signature test. Hypergolic fuels have been loaded aboard the Orbiter. Auxiliary power unit number 2 controller has been removed and replaced. Three of Endeavour's multiplexer/demultiplexers have been replaced, as well. Test conductors have completed solid rocket booster hydraulic circulation and retained a sample for analysis.

The roll-around of Endeavour from pad A to pad B began at about noon today and was expected to be completed by six p.m. Launch pad B validations are also underway today. STS 61 work scheduled: oxidizer side helium signature test; transport payload canister to the pad tonight and lift the payload into the payload changeout room tomorrow morning. Endeavour's payload bay will also be opened tomorrow to receive the HST payload. The flight readiness review will be conducted November 17. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Nov. 15, 1993.]

II

DISCOVERY: STS 60 UPDATE

Discovery's next mission will be STS 60 and the vehicle is currently undergoing processing activities for that mission. The forward reaction control system (FRCS) has been installed in the Orbiter and interface verification checks have been made. In addition, Orbiter door radiator checks have been made and SPACEHAB has been transported to the Orbiter Processing Facility where Discovery is being processed. Current activities include: installation of SPACEHAB into the vehicle's payload bay; forward reaction control system interface verification checks continue; orbital maneuvering system flight control verifications; preparations to install the main engines; stacking the solid rocket booster in Vehicle Assembly Building high bay 3. STS 60 work scheduled: ammonia servicing; main engine installation; orbital maneuvering system flight redundancy checks. [**KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT**, Nov. 15, 1993.]

II

STS 62: U.S. MICROGRAVITY PAYLOAD

Columbia's tailcone has been removed; Space Shuttle's must have the tail cone covering the engine area during ferry flights from California. The Orbiter's waste containment system has been removed. Today, technicians will make Orbiter power system validations and install strongbacks and make preparations for opening the payload bay doors. STS 62 work scheduled: payload bay door functional tests; removal of the Spacelab Life Sciences-2 payload module from the Orbiter's cargo bay. [**KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT**, Nov. 15, 1993.]

November 16:

STS 61: HST PAYLOAD AT PAD

Endeavour was hard down on Launch Complex 39B at 6:07 p.m. The Hubble Space Telescope payloads are now at the pad as well. Work in progress: launch pad B validations; installation of payloads into the pad's Payload Changeout Room (PCR). STS 61 work scheduled: extend the rotating service structure; open Orbiter payload bay doors and install payload; flight readiness review; inertial measurement unit calibrations; main engine flight readiness test. [**KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT**, Nov. 16, 1993.]

II

STS 60: PROCESSING UPDATE

The Spacehab module has been installed in Discovery's payload bay. Technicians in the OPF bay 3 have also conducted forward reaction control system (FRCS) interface verification tests and orbital maneuvering system flight control verification. STS 60 work scheduled: main engine installation; orbital maneuvering system flight redundancy checks; SPACEHAB interface verification tests; orbital maneuvering system redundant electrical circuit verifications.

[KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Nov. 16, 1993.]

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STS 62: APU #2 INSPECTIONS

Columbia is in bay 2 of the Orbiter Processing Facility where strongbacks have been installed and the payload bay doors opened. Technicians have inspected auxiliary power unit #2 and conducted post-mission propellant deservicing. Current processing activities include: Orbiter power system validations; main propulsion system leak and functional checks; auxiliary power unit lube oil servicing and main engine inspections. STS 62 work scheduled: payload bay door functional tests; removal of the Spacelab Life Sciences-2 payload module; auxiliary power unit leak and functional test. **[KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, November 16, 1993.]**

November 17:

STS 61: OFFICIAL DATE SET TODAY

"We know of no issues [NASA managers] are planning on discussing that would threaten Endeavour's target launch dated of December 1," said **Bruce Buckingham**, Kennedy Space Center spokesman. NASA managers are meeting at the space center to address several concerns that uniquely affected Endeavour's pre-flight preparations: the switch of launch pads; the readiness of LC 39B to support the launch and the cleanliness of the Hubble Space Telescope spare parts which make up the prime payload for the STS 61 mission. Buckingham remarked further yesterday, "We understand the [HST] payload is very sensitive to contamination and it needs to be granted all of its due respect." Launch is set to occur in a window which runs from 4:57 to 6:04 a.m. The STS 61 crew includes Commander **Richard Covey**, Pilot **Ken Bowersox** and Mission Specialists **Kathryn Thornton**, **Claude Nicollier** (ESA), **Jeffrey Hoffman**, **F. Story Musgrave** and **Tom Akers**. The launch time or date may yet be impacted by two unmanned rocket launches from Cape Canaveral Air Force Station; these are presently scheduled for the same week. [Banke, **FLORIDA TODAY**, p. 9A, Nov. 17, 1993; Banke, **FLORIDA TODAY**, p. 9A, Nov. 18, 1993; "Note to Editors: **NASA Sets Launch Date for STS 61 HST Servicing Mission**, Nov. 17, 1993.]

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STS 60: SPACEHAB INSTALLED

The SPACEHAB module has been installed in Discovery's payload bay while the Orbiter undergoes pre-rollover processing in OPF bay 3. Forward reaction control system (FRCS) interface verification tests have been conducted along with orbital maneuvering system flight control verifications. Work currently in progress: ammonia servicing; preparations to install the main engines; potable water servicing; stacking solid rocket booster in Vehicle Assembly Building high bay 3. STS 60 work scheduled: main engine installation; orbital maneuvering system

flight redundancy checks and redundant electrical circuit verifications; SPACEHAB interface verification tests. **[KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Nov. 17, 1993.]**

II

COLUMBIA: PROPELLANT DESERVICING

Columbia is in OPF bay 2 where technicians have completed post-mission propellant deservicing. Strongback installation has been completed and the payload bay doors have been opened. Technicians have inspected auxiliary power unit number 2. Work in progress today: Orbiter power system validations; main propulsion system leak and functional checks; auxiliary power unit lube oil servicing and main engine inspections. STS 62 work scheduled: payload bay door functional tests; removal of Spacelab Life Sciences-2 payload module by the end of the week and auxiliary power unit leak and functional testing. **[KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Nov. 17, 1993.]**

November 18:

STS 61: PCR RECEIVES PAYLOADS

Following yesterday's Flight Readiness Review (FRR) held at Kennedy Space Center, STS 61 mission managers selected December 1 as the firm launch date for Endeavour. The window on December 1 extends from 4:57 until 6:04 a.m. EST. The Hubble Space Telescope payload has now been installed into LC 39B's payload changeout room (PCR) in preparation for placement in the cargo bay of Endeavour. Other completed tasks include: the flight readiness review (FRR); extend rotating service structure; Orbiter midbody umbilical unit mate and leak checks; open Orbiter payload bay doors; inertial measurement unit calibrations; launch pad B validations. Work in progress today: main engine flight readiness test; main propulsion system aerosurface cycles; retest of the multiplexer/demultiplexers; final payload bay cleaning; solid rocket booster hydraulic closeouts; auxiliary power unit #2 controller tests; stowage and checkouts of spacesuits in the Orbiter's airlock. STS 61 tasks scheduled: remove payload covers prior to installation of payload into the Orbiter payload bay; aft Orbiter closeouts; Ordnance installation; Hubble Space Telescope (HST) payload interface verification and end-to-end tests. **[KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Nov. 18, 1993.]**

II

STS 60: AMMONIA SERVICING COMPLETE

In OPF bay 3, technicians have completed ammonia servicing on Discovery in preparation for its rollover to the Vehicle Assembly Building. Main engine installation is ready to be implemented and stacking of solid rocket boosters in the VAB is finished. Today, workers are installing the main engines in the Orbiter, servicing the potable water supply and conducting SPACEHAB interface verification tests. STS 60 work scheduled includes: orbital maneuvering system

flight redundancy checks and redundant electrical circuit verifications along with mating the external tank to solid rocket boosters in the VAB's high bay 3. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Nov. 18, 1993.]

[] STS 62: SECOND U.S. MICROGRAVITY PAYLOAD

Main propulsion system leak and functional checks on Columbia have been completed in OPF bay 2. Technicians have also completed: payload bay door functional checks, removal of the Spacelab Life Sciences - 2 payload module and post flight propellant deservicing. Currently, technicians are conducting Orbiter power system validations; auxiliary power unit leak and functional testing and main engine inspections. Scheduled STS 60 tasks: removal of the tunnel adapter; auxiliary power unit lube oil servicing; removal of the STS 58 main engines and transporting the Spacelab Life Sciences-2 payload module to the Operations and Checkout (O & C) Building. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Nov. 18, 1993.]

November 19: STS 61: DELAY POSSIBLE

A sensor problem may prevent Endeavour from launching on its STS 61 mission on December 1. Kennedy Space Center spokesman **Bruce Buckingham** said, "We feel there is a reasonable chance to find a solution that will allow us to fly safely." Pre-launch activities are continuing to allow for an on-time launch "if the technical problem with the sensor is resolved," Buckingham added. The sensor is one of four which measures hydraulic fluid pressure in an actuator within the right-hand wing of Endeavour. The actuator moves an elevon which enables steering during a Shuttle landing. NASA officials noted that even if all four sensors were to fail, there remained other ways for the astronauts to know whether the elevon is working properly. A repair to the sensor would require rolling Endeavour back to the VAB and that would delay the Hubble Space Telescope repair mission until January. Another problem was also being worked: excessive noise over the radios in two of Endeavour's spacesuits. [Banke, FLORIDA TODAY, p. 1A, Nov. 20, 1993; "Hubble-Repair Launch Seen Despite Glitches," THE ORLANDO SENTINEL, p. A-8, Nov. 20, 1993.]

[] U.S. HOUSE: ANOTHER VOTE ON SPACE STATION

The U.S. House of Representatives may face today another vote on the Space Station Program. A House panel will allow an amendment to kill the program to come to a vote. Local Congressman **Jim Bacchus** promised a "full-court press" in an effort to defeat the amendment. He said, "I'm distressed that the third time this year, opponents of the Space Station are seeking an opportunity to re-wage

a battle we have already won twice." [Wheeler, FLORIDA TODAY, p. 3A, Nov. 20, 1993.]

November 20: SILVER SNOOPYS FOR SEVEN AT KSC

NASA astronauts will present seven Silver Snoopy Awards to Kennedy Space Center and NASA employees: **William Olsen** (Satellite Beach, FL) , who is a senior safety engineer with Hernandez Engineering, Inc.; **Cindy Hall** (Titusville, FL), who is a quality assurance specialist with the Safety, Reliability and Quality Assurance Directorate; **Vincent Carrubba** (Satellite Beach, FL), a quality assurance specialist also with the Safety, Reliability and Quality Assurance Directorate; **Michelle Kamman Jones** (Cocoa, FL), a payload integration engineer for the STS 55 mission and **David Taylor** (Cocoa, FL), lead mechanical engineer on MVAK; **Damon Nelson** (Titusville, FL), a senior experiment project engineer who worked on Spacelab 2, and **David Brown** (Titusville, FL) a lead computer engineer, who was recognized for his lead role in software production. ["NASA, KSC Workers Get Silver Snoopys," FLORIDA TODAY, p. 9E, Nov. 21, 1993.]

November 22: SPACE STATION SURVIVES, AGAIN

"I'm thrilled with the victory we've won tonight. Many of my colleagues are beginning to understand there are important policy decisions at stake with our venture with the Russians," said Rep. **Jim Bacchus** (D-Melbourne., FL) after the U. S. House easily turned back an effort to kill the Space Station Program. Bacchus went on to note that there would be other challenges to the Space Station in the future. "I'm certain we will have to fight this fight next year, the year after, and until the Space Station is finally in orbit," he remarked. **Sue Munsey**, President of the Cocoa Beach (FL) Area Chamber of Commerce said after the vote, "It's going to be very, very important for the President to come out strongly and endorse the Space Station in the State of the Union address in January. If he does not, I'm afraid we'll be dealt the same hand we've been dealt this year." [Wheeler, FLORIDA TODAY, p. 1A, Nov. 21, 1993; Wheeler, FLORIDA TODAY, p. 1A-2A, Nov. 23, 1993; Banke, FLORIDA TODAY, pp. 1A-2A, Nov. 24, 1993.]

[] SUSPECT ELEVEN PASSES RETEST

NASA managers must decide by tomorrow whether to waive a launch rule which requires each of four sensors to operating properly at liftoff. Kennedy Space Center spokesman **Bruce Buckingham** said that "for all intents and purposes, the flight controllers in Houston are playing devil's advocate - seeing if they can come up with any rationale for not flying as is." The suspect sensor was disconnected over the weekend and retested, successfully, according to Buckingham. "There's a comfortable feeling among management that they would still maintain their

required redundancy even without the fourth sensor." Only one of the four sensors is needed to gauge hydraulic pressure accurately; the three others act as back-ups. [Halvorson, FLORIDA TODAY, p. 4A, Nov. 23, 1993.]

November 23: HOUSE VOTE SUSTAINS SPACE STATION

The House of Representatives voted today 248 to 184 to kill an amendment which would have cut off all money for the Space Station Program. "A lot of people are really concerned about how the Space Station is going to go. It's been up in the air so much." That was the reaction of **Mike Kinslow**, a Space Station manager for McDonnell Douglas at Kennedy Space Center. The Director of Space Station Operations, **Dick Lyon**, said, "We are very thankful; we're all elated." Rep. **Jim Bacchus** (D-Merritt Island, FL) said, "The next challenge in the form of a vote will come in the authorization and appropriations process for the 1995 budget late next spring. In the meantime, we have to persuade a majority of the House that the redesign is worthwhile, the partnership with Russia is advisable and the whole program is affordable." [Banke, FLORIDA TODAY, pp. 1A-2A, Nov. 24, 1993.]

November 24: ENDEAVOUR GO FOR LAUNCH

By waiving a launch rule, NASA managers avoided the necessity of sending Endeavour back to the Vehicle Assembly Building for repairs; that would have delayed STS 61 until January. The problem was with one of four sensors which monitor the hydraulic pressure in a device which activates a Shuttle wing flap. "We are comfortable," said Kennedy Space Center spokesman **Bruce Buckingham**, "with the redundancy on board, despite the fact that we have one less sensor working." Flight rules had required that each of the four sensors be working to begin the countdown. Officials said that even if all four failed in flight, the astronauts would still be able to monitor the wing flap using other instruments. Former KSC Director **Forrest S. McCartney** pronounced himself unconcerned with the launch rule change: "They've [NASA managers] had a long time to analyze it. It's a whole lot different when you're in the countdown and the vehicle is fueled and nearly ready to go." [Banke, FLORIDA TODAY, Nov. 25, 1993; Banke - "Celestial Spyglass Offers Clues to Science Puzzles," FLORIDA TODAY, Nov. 28, 1993; Banke - "Space for Kids: Hubble Takes Snappy Pictures," FLORIDA TODAY, Nov. 28, 1993; Date - "Just 1 Little Slip and Project Was Ruined," THE ORLANDO SENTINEL, Nov. 28, 1993; Date - "Hubble - Huge Test for NASA," THE ORLANDO SENTINEL, Nov. 28, 1993; Date - "1992 Repair Mission Sent NASA A Message," THE ORLANDO SENTINEL, Nov. 28, 1993.]

November 27: STS 61 CREW ARRIVAL TODAY

The crew of Endeavour's STS 61 mission are expected to arrive at Kennedy Space Center today at approximately 11 a.m. The crew includes Commander **Richard Covey**, Pilot **Kenneth Bowersox**, and Mission Specialists **Story Musgrave**, **Claude Nicollier**, **Tom Akers**, **Kathryn Thornton** and **Jeffrey Hoffman**. The Space Center is shutting down many operations today due to the Thanksgiving holiday. The countdown for STS 61 begins November 28 at 9 a.m. Air Force meteorologists predict a 60% chance of favorable weather for liftoff. [Banke, FLORIDA TODAY, Nov. 27, 1993.]

November 28:

ATLAS FLIES; SHUTTLE READY

An Air Force Atlas rocket launched successfully tonight at 6:40 p.m.; a computer error caused the liftoff to be delayed by 31 minutes. If the Atlas launch had required a lengthy delay, the commencement of Endeavour's STS 61 mission might have been postponed at least 24 hours. Shuttle Test Director **Mike Leinbach** said, "The Shuttle is in good shape. Endeavour is a good ship, and we hope to get her off on the first attempt and get on with this very exciting mission for America and the world." The Atlas mission was prepared in a record 41 days and provided confidence that recent failures of General Dynamics rockets were in the past. "The Atlas launch team has definitely made a statement," said Lt. Col. **Heinz Butner**, commander of the 3rd Space Launch Squadron, which oversees Atlas operations at Cape Canaveral Air Force Station. A new Atlas rocket is scheduled to liftoff no earlier than December 13; the new rocket features strap-on solid rocket boosters. Endeavour will have until December 6 to begin its mission. If the mission is not ongoing by December 9, it will have to be delayed until next year to take into account the Christmas and New Year's holidays. [Banke, FLORIDA TODAY, p. 1A, Nov. 29, 1993.]

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STS 61: COUNTDOWN STARTS TODAY

At 9:00 a.m. this morning, the countdown to launch for STS 61 began. **Terry Oswalt**, an astronomer for Florida Tech (Melbourne, FL) said, "I've got a couple of former students and several colleagues whose jobs basically depend on the success of this mission." On his arrival at Kennedy Space Center two days ago, Commander **Richard Covey** said, "We look forward to putting on quite a show." He added, "We've trained hard, and we feel confident that two weeks from (today) we're going to be back here getting ready to head back to Houston in the other direction after a very successful mission." [Banke, FLORIDA TODAY, Nov. 28, 1993.]

II

LAUNCH OF ATLAS 2 CRITICAL TONIGHT

Time needed to reconfigure for launch makes it critical that the Air Force successfully launch tonight's Atlas 2 rocket. An inability to launch would push Endeavour's launch to December 2 rather than December 1. "We do have a concern with the weather," said Air Force spokeswoman **Terri Bracher**. "We're looking at a 60 percent chance of violating launch weather constraints because of potential thick clouds in the area. The Atlas payload for this mission is a Defense Satellite Communications System Spacecraft, the fourth in a series of nine DSCS under an \$858 million contract the Air Force has with General Dynamics, builder of the Atlas 2. [Banke, FLORIDA TODAY, Nov. 28, 1993.]

II

ATLAS LAUNCHED SUCCESSFULLY

An Atlas 2 rocket lifted a military communications satellite into orbit tonight at 6:40 p.m. and the launch cleared the way for the December 1 launch of STS 61. The rocket lifted off after a 31 minute delay because of a faulty valve reading. The Defense Satellite Communications System satellite is number 8 in a planned series of such spacecraft used to relay secret conversations among U.S. military personnel. ["Military Satellite Launched Into Orbit Aboard Rocket," THE ORLANDO SENTINEL, Nov. 29, 1993; Banke, FLORIDA TODAY, p. 1A, Nov. 29, 1993.]

November 30:

CHLORINE LEAK AT KSC

A malfunctioning valve in one of two chlorine tanks allowed chlorine gas to escape from a KSC tank farm and led to the evacuation of about 100 persons from Kennedy Space Center and nearby neighborhoods on Merritt Island. The tank farm is located on the southern edge of the space center property. No one was injured and there was no impact on the impending launch of Endeavour on its STS 61 mission. Gas flowed from late Monday [November 29] or early Tuesday morning until it was discovered by a NASA worker who checked the tanks to assure that they had switched properly. He alerted authorities when he detected a hissing sound, said KSC spokesman **Mitch Varnes**. News of the leak spread through north Merritt Island neighborhoods which evacuated over the course of an hour. The incident did tie up some rush-hour traffic at the space center because officials closed State Road 3 from State Road 528 to the NASA Causeway for about 15 minutes. [Evans, FLORIDA TODAY, Dec. 1, 1993.]

December

December 1: STS 61: WEATHER SCRUBBED MISSION

The launch of Endeavour on mission STS 61 was scrubbed today at 5:58 a.m. due to unacceptable weather, specifically higher than allowable crosswinds and scattered showers within 20 miles of the Shuttle Landing Facility. Launch has been rescheduled for tomorrow. The launch window extends from 4:27 until 5:38 a.m. EST. Work to safe the vehicle at the pad is currently in progress. Draining of the liquid hydrogen and liquid oxygen reactants is expected to be completed by late morning. The countdown is expected to begin this afternoon at the T-11 hour mark at about 2:07 p.m. At about 7:30 p.m. today, operations will begin to load the external tank with more than 500,000 gallons of liquid hydrogen and liquid oxygen.

Weather forecasters indicate a forty (40) percent probability of weather prohibiting launch tomorrow. The primary concerns are for cloud ceilings below 8,000 feet and a slight chance of showers. The winds at pad 39B tomorrow are expected to be from the east northeast at 8 to 14 knots; temperature 70 degrees F; visibility 7 miles; and clouds scattered to broken at 4,500 feet. The 24-hour delay forecast reveals an improved situation and lists only a 20 percent chance of violation. The seven-member crew have returned to their quarters where they will eat lunch and prepare for sleep. They will be awakened later tonight at about 9 p.m. and prepare for the second launch attempt early tomorrow. Departure for the pad is set for about 12:42 a.m. tomorrow.

Mission Responsibility	Crew Member
Commander	Richard Covey
Pilot	Kenneth Bowersox
Mission Specialist (MS1)	Kathryn Thornton (EVA3)
Mission Specialist (MS2)	Claude Nicollier
Mission Specialist (MS3)	Jeffrey A. Hoffman (EVA1)
Mission Specialist (MS4)	F. Story Musgrave (EVA2)
Mission Specialist (MS5)	Thomas Akers (EVA4)

[**KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT**, Dec. 1, 1993; Halvorson, FLORIDA TODAY, pp. 1A-2A, Dec. 1, 1993.]

December 2: STS 61: ENDEAVOUR OFF TO FLYING START

Bad weather yesterday prevented the launch of the Space Shuttle Endeavour on its STS 61 mission. This morning, however, the mission commenced right on time at 4:27 a.m. EST. On reaching orbit, Commander **Richard Covey** said, "It's a beautiful sunrise." Astronaut **Ken Cockrell**, who observed the launch from Mission Control (JSC, Houston, TX) said, "It looked awfully good from here, too." Mission Manager **Loren Shriver**, himself a former astronaut, said, "This mission is higher profile than most. I have big confidence we will get this one done." Once in orbit, Endeavour will begin to chase the Hubble Space Telescope so as to be in position for the start of the repair effort on December 4. The Orbiter should be within 35 feet of the HST by 4:10 a.m. Saturday. Commander Covey referred to the fact that there is only enough fuel aboard Endeavour for one rendezvous attempt; he said before the launch, "We have to do it right the first time." Approximately 420 journalists were on hand for the launch, according to **Leslie Williams**, accreditation secretary for the KSC Media Services Branch. [Banke, FLORIDA TODAY, pp. 1A-2A, Dec. 3, 1993; Date, THE ORLANDO SENTINEL, pp. A-1 & A-18, Dec. 3, 1993.]

December 6: SPACE STATION TO INCLUDE RUSSIA

"A major hurdle has been overcome. The governments of the international partners are now all agreed to bring in Russia. There was a time when we weren't so sure," said a Clinton administration official who spoke off the record. The Space Station partners met today in Washington to give their assent. "The governmental representatives who were there, including the French, Germans, Canadians and Japanese, all made strong opening statements about positive factors Russia can bring. They also emphasized how it's consistent with the broader objectives of integrating Russia into the international community." The Vice President of the United States will travel to Moscow December 14-17 to settle details of Russia's participation in the Space Station Program. ["Space Station Partners Agree to Invite Russia," FLORIDA TODAY, p. 2A, Dec. 7, 1993; "U.S. Asks Russia to Join Space Station," THE ORLANDO SENTINEL, p. A-6, Dec. 7, 1993.]

December 7: DELTA 2 READY FOR LAUNCH

"We're not looking at any issues; launch activities are proceeding as planned," said McDonnell Douglas spokeswoman **Anne McCauley** about tonight's launch of a commercial Delta 2 rocket. The liftoff will take into space a North Atlantic Treaty Organization (NATO) military communications satellite. According to Air Force weather watchers, there is a 60 percent chance of acceptable launch conditions. Another upcoming nighttime launch is that of an Air Force Atlas

rocket on December 14. [Banke, FLORIDA TODAY, p. 2A, Dec. 7, 1993; Date, THE ORLANDO SENTINEL, p. A-6, Dec. 7, 1993.]]

II

STS 60: RMS STOWED

Discovery remains in Orbiter Processing Bay 3 where it is undergoing processing for its STS 60 flight next month. Technicians have stowed the Orbiter's remote manipulator arm (RMS) and concluded mass memory unit loading. Other completed tasks include: nose gear functional test; landing gear functional test; aerosurface cycling; hydraulic system testing; payload bay door radiator closeouts; Ku-band antenna self-testing; SPACEHAB-2 leak checks. Work in progress includes: crew compartment structural leak check; aft main engine compartment closeouts; Orbiter mid-body closeouts; tile closeouts; SPACEHAB-2 closeouts; potable water sampling; stowage of Ku-band antenna for flight; final test of payload bay cameras. STS 60 work scheduled: payload bay cleaning; closure of payload bay doors; UHF air-to-ground antenna check; main propulsion system pneumatic system testing; Orbiter structural and aft compartment leak checks; VAB rollover targeted for December 15 with rollout to Launch Complex 39A targeted for December 20. Meanwhile, processing activities continue for Columbia's STS 62 mission. The planned removal and replacement of the #1 fuel cell is occurring today. Main propulsion system leak and functional checks are in process. S-band communications system testing is also underway. Planned removal of auxiliary power unit #2 is complete. Loading of mass memory unit #2 has also been completed. The left hand orbital maneuvering system pod is scheduled for removal tonight. [SPACE SHUTTLE STATUS REPORT, Dec. 7, 1993.]

II

DELTA LAUNCHES NATO SATELLITE

Tonight at 7:48 p.m., at Cape Canaveral Air Force Station the Air force launched a Delta 2 rocket which carried aloft a communications satellite for the North Atlantic Treaty Organization [NATO]. The satellite was the eighth such craft built for NATO by British Aerospace and Matra Marconi to provide secure communications; it will begin service in the fall of 1994 and last until 2001. An earlier satellite was launched in January 1991 and became operational in October 1993; the two spacecraft cost approximately \$366 million, including special launch and control services. ["Delta Rocket Lofts A NATO Satellite," THE ORLANDO SENTINEL, Dec. 8, 1993; Banke, FLORIDA TODAY, p. 2A, Dec. 8, 1993.]

December 8:

STS 60: SPACEHAB WORK COMPLETED

Technicians in Orbiter Processing Facility bay 3 have completed a number of tasks in the processing of Discovery for next month's STS 60 mission: SPACEHAB-2 closeouts and leak checks; potable water sampling; leak checks of forward reaction

control system; stowage of Ku-band antenna for flight; mass memory unit loading; nose gear functional test; landing gear functional test; aerosurface cycling; payload bay door radiator closeouts; and, Ku-band antenna self-testing. Work in progress: nosewheel tire and strut pressurization; payload bay cleaning; UHF air-to-ground antenna test; crew compartment structural leak check; aft main engine compartment closeouts; Orbiter mid-body closeouts; tile closeouts. STS 60 work scheduled: closure of payload bay doors; crew cabin leak checks; Orbiter structural and aft compartment leak checks; VAB rollover targeted for December 15 with rollout set for December 20. [SPACE SHUTTLE STATUS REPORT, Dec. 8, 1993.]

II STS 62: COLUMBIA PROCESSING UPDATE

Columbia remains in Orbiter Processing Facility bay 2 where main propulsion system leak and functional checks are in work. Removal of the left hand orbital maneuvering system pod is underway. Reinstallation of drag chute pyrotechnic hardware is being performed. Servicing of the waste containment system is in process. Engineers are troubleshooting one of the flight data recorders. The TACAN self-test is complete. Fuel cell #1 has been removed as planned. [SPACE SHUTTLE STATUS REPORT, Dec. 8, 1993.]

December 9: AFT COMPARTMENT CLOSEOUTS

In OPF bay 3, technicians have completed Orbiter aft engine compartment closeouts; made SPACEHAB leak checks and cleaned the payload bay for the final time before rolling Discovery over to the Vehicle Assembly Building for mating with the STS 60 solid rocket boosters and external tank. Currently, processing tasks include: closing the payload bay doors; Orbiter mid-body closeouts; stowage of Ku-band antenna; recharging the Wake Shield Facility batteries and final landing gear checkouts. STS 60 work scheduled: payload bay door strongback removal; weight and center of gravity checks; installation of the Orbiter on the Orbiter transporter; installation of the Getaway Special (GAS) bridge into the transport canister; rolling Discovery to the Vehicle Assembly Building on December 14 and rolling the stacked Space Shuttle to Launch Complex 39A on December 20. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Dec. 9, 1993.]

II STS 62: COLUMBIA MISSION UPDATE

Columbia's auxiliary power unit (APU) number 2 has been removed from the Orbiter; the left hand (OMS) pod has also been removed. Technicians completed TACAN activation and self test. Today, Shuttle workers will conduct checks of the forward reaction control system; drag chute pyrotechnic operations; main propulsion system leak and functional checks; solid rocket booster stacking operations in the VAB high bay 1. STS 62 work scheduled: removal and

replacement of the humidity separator and installation of the left hand orbital maneuvering system (OMS) pod. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Dec. 9, 1993.]

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SPACEPORT USA: CHANGES AFOOT

A new IMAX theater has recently been dedicated at Kennedy Space Center's Spaceport USA; the new theater allows simultaneous showing of two IMAX films: "The Dream Is Alive" and "The Blue Planet." The films are just part of the growth of the fifth most popular tourist attraction in Florida. Next week another major attraction will be available for photography - a full-scale, high-fidelity reproduction of a Space Shuttle Orbiter. The replica is being assembled on the eastern end of the large visitors complex. The Orbiter itself is approximately the size of a medium range jetliner and its vertical stabilizer will be visible for quite a distance. At some point on the morning of December 15, the 50 millionth visitor to Spaceport USA will arrive at the attraction. The visitor will receive special red-carpet treatment and be presented with a number of valuable gifts. Currently, attendance is running at approximately 2.6 million visitors per year. [Young, NASA/KSC News Release No. 153-93, Dec. 9, 1993.]

December 13: ENDEAVOUR LANDS AT KSC ON TIME

The Space Shuttle Endeavour made a successful landing in the darkness at Kennedy Space Center this morning at 12:26. The STS 61 mission which made repairs to the Hubble Space Telescope lasted just under 11 days. Deorbit burn came on orbit 161 at about 11:15 p.m. Endeavour entered Florida airspace near the city of Crystal River and traveled east across the state. It passed over Orlando and Titusville prior to landing. When the Orbiter passed over Orlando it was about 5 minutes before landing and was traveling at an altitude of approximately 91,000 feet and traveling at a speed of about Mach 3. The landing this morning was the 18th at KSC. It was the seventh night landing and only the second such landing at the space center. The first such landing was on September 22 at the conclusion of the STS 51 mission. A chart of Kennedy Space Center landings follows:

STS 41B	Challenger	February 11, 1984
STS 41G	Challenger	October 13, 1984
STS 51A	Discovery	November 16, 1984
STS 51C	Discovery	January 27, 1985
STS 51D	Discovery	April 19, 1985
STS 38	Atlantis	November 20, 1990
STS 39	Discovery	May 6, 1991
STS 43	Atlantis	August 11, 1991
STS 45	Atlantis	April 2, 1992
STS 50	Columbia	July 9, 1992
STS 46	Atlantis	August 8, 1992
STS 47	Endeavour	September 18, 1992
STS 52	Columbia	November 1, 1992
STS 54	Endeavour	January 19, 1993
STS 56	Discovery	April 17, 1993
STS 57	Endeavour	July 1, 1993
STS 51	Discovery	September 22, 1993
STS 61	Endeavour	December 13, 1993

[NASA/KSC Release No. 153-93, Dec. 12, 1993; KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Dec.10, 1993; Date, THE ORLANDO SENTINEL, Dec. 14, 1993; Halvorson, FLORIDA TODAY, pp. 1A-2A, Dec. 14, 1993.]

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JUNKYARD YIELDS SHUTTLE TREASURE

"It shouldn't have been out there. My finding it saved a delay in launch from what I was told," said NASA employee **Brooks Humphrys** about the Shuttle part he found in a Kennedy Space Center junkyard while looking for recyclable materials. What Humphrys found was a piece of the Space Shuttle Discovery's wing; it was valued at \$304,000, according to space center officials today. The wing panel is one of 22 on the Orbiter wing's leading edge; collectively they help keep the vehicle from burning up during re-entry. Officials said that it had been

packed inside a heavy, sealed wooden crate and accidentally discarded by Lockheed Space Operations Co. workers. They had put the crate along with several others outside Discovery's hangar and all were hauled away as part of the cleanup for the recent Open House at Kennedy Space Center. The material was taken by EG&G Florida workers who took it to a landfill on the east end of Schwarz Road, according to KSC spokesman **Bruce Buckingham**. What caused Humphrys to be curious about the crate was its appearance compared to other crates in the landfill. He thought the crate looked too new and out of place. He opened the crate and saw an object wrapped in packing material. "I didn't know what it was, but it looked important so I began calling the names on the labels inside. Word eventually reached a Lockheed worker who came to retrieve the panel for the Orbiter Processing Facility. An investigation board was formed and a report written. The findings were presented to Shuttle Launch Director **Robert B. Sieck** and, as a result, LSO changed the way materials are handled in the processing area. Crates are now marked clearly whether they are to be recycled, or not. EG&G also responded by changing landfill procedures to require all lids to be removed from any containers before the waste is accepted. [Banke, FLORIDA TODAY, p. 1A, Dec. 14, 1993.]

II

STS 60: KU-BAND ANTENNA STOWED

Discovery continues with pre-rollover processing activities in OPF bay 3; technicians there have stowed the Ku-band antenna and closed the payload bay doors. Other completed tasks include: a retest of the startracker; Orbiter and mid-body closeouts; final landing gear closeouts and installation of the Getaway Special (GAS) bridge into the transport canister. Work in progress for the STS 60 mission next month: final Orbiter power down; payload bay door strongback removal; recharge of the Wake Shield Facility batteries. STS 60 work scheduled: weight and center of gravity checks; installation of Orbiter on transporter; rollover to the Vehicle Assembly Building December 14; lift and mate Orbiter to the external tank; rollout to the pad targeted for December 20. [**KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT**, Dec. 10, 1993.]

II

STS 62: US MICROGRAVITY PAYLOAD-2

Alongside Discovery in the Orbiter Processing Facility is the Space Shuttle Columbia which is being readied for its next mission, STS 62, in early March 1994. Columbia, in OPF bay 2, has undergone a checkout of its cabin pressure transducer and leak and functional checks of the main propulsion system's helium system. Work in progress today includes: installation of the left-hand orbital maneuvering system (OMS) pod; checks of the forward reaction control system; main propulsion system leak and functional checks; solid rocket booster stacking operations in the VAB's high bay. STS 62 work scheduled: drag chute pyrotechnic operations; removal and replacement of the humidity separator;

removal and replacement of the fuel cell number 1; OMS pod and functional checks. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Dec. 10, 1993.]

DECEMBER 14: STS 59: PAYLOAD STATUS REPORT

The Space Radar Laboratory (SRL-1) reaches a milestone this week in the Operations and Checkout (O & C) Building at the Kennedy Space Center with the performance of the Mission Sequence Test. This test involves executing portions of the mission timeline with SRL in flight configuration to verify proper performance. This test runs for approximately 50 hours and will be performed over a period which covers four days concluding December 16. SRL is a joint project between the German Space Agency and the Italian Space Agency whose associated contractors, Dornier and Alenia Spazio, will be participating in the test for the X-band instruments. For NASA, in addition to KSC engineers and technicians, there are representatives from the Jet Propulsion Laboratory and contractor Ball Aerospace for the C-band and L-band instruments.

The Langley Research Center will participate in the testing of an instrument called MAPS, which stands for the Measurement of Atmospheric Pollution from Satellites, and is attached to a Mission Peculiar Support Structure (MPSS). On January 4, SRL-1 is scheduled to be moved to the Cargo Integrated Test Equipment (CITE) stand in the O & C to begin one week of tests. This will verify the electrical interfaces and readiness to be integrated with the Space Shuttle Orbiter. Then, in mid-February, SRL-1 will be moved to OPF bay 1 to be placed in the payload bay of Endeavour. This will be followed by an Interface Verification Test (IVT) to verify the connections with the Orbiter and the flight deck. At the end of February an End-to-End test will be conducted to verify the compatibility to use the NASA Communications Network (NASCOM) to provide communications between SRL in the payload bay, the Tracking and Data Relay Satellite, the Goddard Space Flight Center (Greenbelt, MD), and Mission Control at the Johnson Space Center (Houston, TX).

Then the first week of March Endeavour will move to the Vehicle Assembly Building and out to the launch pad. No significant payload testing or servicing is required at the pad. The SRL 40-foot by 20-foot phased array antenna arrived at the SAEF-2 spacecraft checkout facility at KSC on July 27 where stand-alone tests were performed. Meanwhile in the O & C, the SRL-1 Spacelab pallet was undergoing mechanical and electronic build-up with associated testing. The antenna was moved from SAEF-2 to the O & C on November 8 for mating with the pallet on November 24 and was followed by a 5-day IVT which concluded December 6. The STS 59 first SRL mission will provide images and geophysical measurements of topography, vegetation, deforestation and soil erosion, ocean dynamics, wave fields and wind fields, volcanism and tectonic activity.

Approximately 30 million square miles of the Earth will be surveyed. The MAPS instrument will study carbon monoxide concentrations in the middle troposphere on a global scale. [Diller, **STS 59 PAYLOAD STATUS REPORT: SPACE RADAR LABORATORY**, Dec. 14, 1993.]

II **STS 60: DISCOVERY ROLLOVER DELAYED**

Mission managers decided today not to roll Discovery to the Vehicle Assembly Building or to the pad prior to the Christmas holidays. Discovery will remain in OPF bay 3 for additional testing on all 44 reaction control system thrusters (R1R) following its most recent mission, STS 51, managers decided further inspections of the remaining thrusters was warranted. Thruster R1R has been replaced. The move to the VAB will not occur until after the first of next year. Weight and center of gravity checks have been completed; the payload bay doors have been closed and the star tracker has been retested. Technicians will set up for reaction control system thruster testing in the OPF today; the test will occur December 16. Rollover to the VAB will occur after the first of the year. [**KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT**, Dec. 14, 1993.]

II **STS 62: MISSION UPDATE**

In Orbiter Processing Facility bay 2, technicians have installed the left-hand orbital maneuvering system (OMS) pod and have completed checks of the forward reaction control system. Work in progress: left-hand orbital maneuvering system pod functional checkout; removal and replacement of fuel cell number 1; drag chute pyrotechnic operations; checkout of freon coolant loop number 2; main propulsion system leak and functional checks and solid rocket booster stacking operations in the VAB's high bay 1. STS 62 work scheduled: integrated drag chute installation. [**KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT**, Dec. 14, 1993.]

II **STS 59: SPACE RADAR LABORATORY**

Post landing debris inspections of Endeavour's thermal protection system indicated the Orbiter sustained a total of 120 hits, of which 13 had a dimension of one inch or greater. Both of these totals are less than average. Endeavour was towed to OPF bay 1 following its landing at Kennedy Space Center on runway 33 at 12:25 a.m. yesterday. Work in progress today: gain access to Orbiter crew compartment and engine compartment; begin operations to off-load onboard cryogenic reactants; payload bay door latch functional test; thermal protection system post-flight inspections; chin panel inspections and main engine inspections. Scheduled operations include: opening the payload bay doors; hydraulic power up operations and removal of the payload support equipment. [**KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT**, Dec. 14, 1993.]

UNDERSEA CELSS CROP HARVESTED

Biologists from NASA's Kennedy Space Center today harvested the first crop of plants ever to undergo a full-duration growth cycle in a protected and environmentally controlled underwater laboratory. The harvesting of 18 heads of Waldmann's Green lettuce took place inside an undersea research facility at Key Largo, FL, and is a continuation of NASA's research of plants and the ability successfully to grow them in a Controlled Biological Life Support System (CELSS). The CELSS project is being developed for a time when astronauts may have to grow their own food during long-duration missions to the moon, Mars or beyond. The program is funded by NASA Headquarters (Washington, D.C.), and managed by KSC's biomedical operations and research office.

Over the last few years, scientists have grown and harvested several crops of lettuce, potatoes, soybeans and wheat inside a CELSS chamber at KSC. However, today's harvest signifies the beginning of a challenging new era in CELSS research, one in which plants are grown in an isolated habitat similar to what may be encountered during future space voyages. The lettuce was planted on November 18, 1993, and spent its entire growth cycle inside a habitat owned by the Marine Resources Development Foundation (MRDF). The MRDF area in Key Largo is the world's only permanent underwater facility designed primarily for scientific research.

The plants were tended daily by MRDF researcher **Chris Olstad** and checked weekly by KSC bioengineer **Dennis Chamberland**. "I'm very pleased with the results of this first crop of lettuce," Chamberland said. "We pursued this venture as a prototype for a similar 90-day test in 1994....The entire KSC CELSS team put a lot of effort into making this first test such a success, and I believe we're on track for going ahead with the more extensive undersea project by late fall or early winter of next year." Besides today's CELSS harvest, there is only one other documented instance of environmentally controlled undersea plant growth. This first attempt at underwater farming occurred in 1965 when scientists planted barley inside the SEALAB II module. This experiment was short-lived, though, and failed just two weeks into the plants' 100-day life cycle. [NASA/KSC Release No. 154-93, Dec. 14, 1993.]

December 16:

AERONAUTICS AGREEMENT

NASA and the Russian State Committee for the Defense Branches of Industry (GOSKOMOBORONPROM) signed a memorandum of understanding today in Moscow to cooperate in eight areas in fundamental aeronautical sciences. The agreement was signed by NASA Administrator **Daniel S. Goldin** and GOSKOMOBORONPROM Chairman Mr. Glukhikh. "With the signing today of the new Aeronautics agreement, NASA is entering a new partnership with our

Russian colleagues to advance aeronautical science," said Goldin. The agreement calls for cooperative activities in the following areas:

- 1) Transition and Turbulence - Fundamental investigations of initial disturbance fields and their receptivity into the boundary layer at low and high speeds.
- 2) Composite Structures and Materials - Fundamental investigations of advanced high-temperature composites, adhesives and sealants.
- 3) Chemically Reacting Flows - Fundamental investigations of chemical kinetic reaction mechanisms, turbulence closure for reacting flows and computational modeling.
- 4) Thermal Protection System Materials - Fundamental investigations of the catalytic efficiency and overall performance of heat shield materials.
- 5) Environmental Concerns in Aviation - Research on the effects of engine emissions on the atmosphere, in particular, the ozone layer, generation, propagation and prediction of acoustic waves, including sonic boom.
- 6) Hypersonic Technologies - Fundamental investigations of the controlling physical phenomena of hypersonic flight.
- 7) Experimental Test Facilities - Use of ground and flight test facilities and techniques for research on advanced aeronautical technologies.
- 8) Advanced Aerospace Materials - Investigation of the properties of new materials for use in aerospace programs.

NASA and GOSKOMOBORONPROM will establish a Joint Working Group On Aeronautical Sciences to manage the new cooperative activities. [NASA/KSC Release : 93-221, Dec. 16, 1993; "Gore Optimistic On U.S.-Russia Space Merger," FLORIDA TODAY, p. 4A, Dec. 15, 1993; Halvorson, FLORIDA TODAY, pp. 1A-2A, Dec. 17, 1993.]

II

JOINT SHUTTLE/MIR MISSIONS

NASA and the Russian Space Agency [RSA] have agreed to up to 10 Shuttle flights to Mir with a total of 24 months time onboard Mir for U.S. astronauts, a program of scientific and technological research, and the upgrade and extension of the Mir lifetime during the period 1995 - 1997. This is the first of a three-phase program in human spaceflight cooperation which may culminate in the construction of an international Space Station. NASA Administrator **Daniel S. Goldin** and RSA Director General **Yuri Koptev** signed this protocol today in Moscow, expanding the terms of the 1992 Human Space Flight Cooperation Agreement. "This is a very significant step in expanding our human spaceflight cooperation with our Russian friends," Goldin said. "These activities will provide valuable experience for the construction and operation of the international Space Station." The following is a summary of cooperative activities outlined in this protocol:

- 1) An additional Russian cosmonaut flight on Space Shuttle mission STS 63 scheduled for launch in 1995. Colonel **Vladimir G. Titov**, the back-up cosmonaut currently in training at NASA's Johnson Space Center for the January 1994 flight (STS 60), will be the primary cosmonaut for the STS 63 flight. **Sergei K. Krikalev**, the STS 60 primary cosmonaut, will act as the backup. During the STS 63 mission, the Space Shuttle will perform a rendezvous with the Mir-1 Space Station and will approach to a safe distance.
- 2) The Space Shuttle will rendezvous and dock with the Mir-1 in October-November 1995, and the Shuttle crew may include Russian cosmonauts. Mir-1 equipment, including power supply and life support system elements, also will be carried. The crew will return on the same Space Shuttle mission. The mission will include activities on Mir-1 and possible extravehicular activities to upgrade solar arrays.
- 3) NASA-designated astronauts will fly on the Mir-1 Space Station for an additional 21 months for a total of 2 years. This will include at least four astronaut flights.
- 4) The Space Shuttle will dock with Mir-1 up to ten times. The Shuttle flights will be used for crew exchange, technological experiments, logistics and sample return. Some of those flight programs will be developed by the Mission Science Joint Working Group. The activities carried out in this program will expand ongoing research in biotechnology, materials sciences, biomedical sciences, Earth observations and technology.
- 6) NASA and RSA will initiate in 1993 the joint development of a solar dynamic power system with a test flight on the Space Shuttle and Mir in 1996, the joint development of spacecraft environmental control and life support systems and studies on potential development of a common space suit starting with the compatibility of respective spacesuits.
- 7) A crew medical support program for the benefit of both sides' crew members, including the development of common standards, requirements, procedures, databases and countermeasures will be initiated. [NASA/KSC Release: 93-222, Dec. 16, 1993.]

December 15: ATLAS 2AS LAUNCHES SUCCESSFULLY

Liftoff of the new General Dynamics Atlas 2AS came tonight at 7:40 p.m., delayed about 18 minutes by a minor electrical problem. "I'm happy," said **Michael Wash**, President of General Dynamics' Commercial Launch Systems Division. "It's a big boost for us. It went right down the line and it was a perfect launch. " The rocket's payload was a \$125 Telstar 401 satellite; it was delivered to orbit in about thirty minutes after launch. The rocket carried four boosters, two of which ignited initially, followed by the other two a minute after liftoff. Tonight's launch was the first ever for the new vehicle and for its payload, a new kind of satellite. "We believe Telstar 401 will open the door to a whole new era

of satellite communications," said **Ernest DeNigris**, AT&T's General Manager for the Telstar 401 Program. "It's loaded with new state-of-the-art features and capabilities that are sure to be a big hit with our customers," he added. AT&T officials said that they expected the satellite to be tested and ready for operation in early January 1994. [Banke, FLORIDA TODAY, Dec. 14, 1993; Date, THE ORLANDO SENTINEL, p. A-6, Dec. 14, 1993; Banke, FLORIDA TODAY, Dec. 15, 1993; Banke, FLORIDA TODAY, Dec. 16, 1993.]

December 18: GREATHOUSE GIVEN SILVER SNOOPY

Gene Greathouse, a Lockheed Space Operations Co. engineer, was recently presented the coveted Silver Snoopy Award by astronaut **Mark Lee**. Greathouse is a senior reliability engineer who is responsible for performing systems reliability analyses of Shuttle landing aids at three sites in the United States and six sites in Europe and Africa. ["Lockheed Engineer Gets Silver Snoopy Award," FLORIDA TODAY, p. 9E, Dec. 19, 1993.]

December 20: PNEUMATIC SYSTEM DECAY CHECKS

Technicians in OPF bay 3 have completed pneumatic system decay checks; established orbital maneuvering system (OMS) trickle purge; main landing gear tire pressure top-off for the Orbiter's next mission; cycled Orbiter's vent doors for next month's rollover to the VAB; and a successful check of the Orbiter's Reaction Control System thrusters. Work in progress: configuring facility and vehicle for the holiday break; thermal protection system inspections. Nothing significant is scheduled for next week for the processing team. The current schedule calls for Discovery to be transferred to the Vehicle Assembly Building on January 4 and then to Launch Complex 39A on January 10. The payload will be sent to the pad on January 6. The terminal countdown demonstration test is currently scheduled for January 13-14 and the flight readiness review is set for January 20. [KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT, Dec. 20, 1993.]

December 21: STS 60: ROLLOVER SET FOR JAN. 4

The current schedule calls for the Space Shuttle Discovery to be transferred to the Vehicle Assembly Building on January 4 and then to pad A on January 10. The payload will be sent to the pad on January 6. The terminal countdown demonstration test [TCDT] is presently set for January 13-14 and the flight readiness review [FRR] is targeted for January 20. Completed tasks include: forward compartment/crew cabin closeout; T-0 umbilical cables disconnected for rollover; main landing gear tire pressure topped-off for mission. Work in progress: jackdown to floor and installation onto Orbiter transfer vehicle for the rollover to the VAB; preparations for the holiday stand down. Minimal work is

planned this week for Orbiters Columbia and Endeavour; the Shuttle processing team is given a holiday break from December 23 through January 3, 1994. [**KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT**, Dec. 21, 1993; Banke, FLORIDA TODAY, Dec. 23, 1993; Banke, FLORIDA TODAY, Dec. 27, 1993.]]

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CALIFORNIA BOC AWARDED

John F. Kennedy Space Center today awarded Space Mark, Inc. [Colorado Springs, CO] a \$6,973,838 contract for overall base operations at its West Coast launch site at Vandenberg Air Force Base [CA]. The period of performance is three years, beginning February 1, 1994, and ending January 31, 1997. The contract gives NASA the option of extending performance until January 31, 2001, and has a potential overall value of over \$17 million. Under the terms of the contract, Space Mark is responsible for the operation, management, and maintenance of facilities, systems, equipment, support services and specified technical/administrative operations at NASA facilities located at Vandenberg AFB. NASA uses Vandenberg as its prime launch site for polar-orbiting spacecraft, launched on ATLAS, DELTA and other expendable launch vehicles. The contract was competed nationally as a set-aside for small disadvantaged businesses. NASA solicited 182 sources for negotiation of the contract and received 11 offers in response. [NASA/KSC Release No. 158-93, Dec. 21, 1993.]

December 29:

1993: YEAR IN SPACE REVIEW

All spaceflight hardware is secure in its processing facilities and the team at NASA's John F. Kennedy Space Center (KSC) is off for the holidays, concluding a busy and eventful year of operations at America's spaceport. Seven Space Shuttle missions were successfully launched from KSC in 1993, with five flights ending at the center's Shuttle Landing Facility (SLF). KSC's expendable vehicles group assisted and coordinated with the launching of space vehicles from both Florida and NASA's West Coast launch site in California. Other KSC divisions made significant contributions in engineering, the sciences and toward the continuous improvement of operations at the space center.

The year of Shuttle launches began and ended with NASA's newest spaceship, Endeavour. On January 13 at 8:59 a.m. EST, Endeavour lifted off from Launch Complex 39B carrying a five-member flight crew and the fifth Tracking and Data Relay Satellite (TDRS-6). The purpose of the mission was two-fold: to safely and successfully deploy TDRS-6 and to have a pair of spacewalking astronauts test techniques that may eventually be used during the in-space assembly of the International Space Station. TDRS-6 was deployed on the first day of the flight and is now an operating part of the TDRS network used to transmit communication between the Space Shuttle and ground controllers. Astronauts

Gregory Harbaugh and **Mario Runco** left the confines of Endeavour's crew compartment on the mission's fifth day and spent five hours performing a series of tasks to increase NASA's knowledge of working in space.

The Diffuse X-Ray Spectrometer (DXS) was mounted in Endeavour's payload bay during STS 54 and used to collect data on X-Ray radiation from a variety of sources in deep space. Several middeck experiments were also carried aboard Endeavour on STS 54, including one designed and sponsored by KSC's life sciences team. The Chromosome and Plant Cell Division in Space Experiment (CHROMEX) is an ongoing investigation into the effects of microgravity on the development and growth of plants. The STS 54 mission ended on January 19 at 8:37 a.m. EST with a landing at Kennedy Space Center on runway 33. The Shuttle completed 96 orbits, and the mission duration was five days, 23 hours and 38 minutes. The STS 54 crew was comprised of Commander **John Caspar**, Pilot **Donald McMonagle** and Mission Specialists **Mario Runco**, **Gregory Harbaugh** and **Susan Helms**. The second flight of 1993, STS 56 was hosted by the Orbiter Discovery. The first of the year's two nighttime launches took place at Launch Complex 39B on April 8 at 1:29 a.m. EDT. The mission included a five-member crew and the Atmospheric Laboratory for Applications and Science-2 (ATLAS-2) Spacelab payload. ATLAS-2 is an element of NASA's Mission to Planet Earth Program and includes the same seven instruments flown on the March 1992 flight of ATLAS-1. These primary instruments will also be flown on ATLAS-3, now scheduled for launch in the fall of 1994. The primary purpose of ATLAS-2 was to collect data on the relationship between the sun's energy output and Earth's middle atmosphere and how these factors effect the ozone layer. The knowledge gained from ATLAS-2 and others in the Mission to Planet Earth Program are providing scientists with a greater understanding of Earth's continuously changing state.

Another significant payload on STS 56 was the Shuttle Point Autonomous Research Tool for Astronomy-201 (SPARTAN-201), a free-flying science platform that allowed scientists to study the velocity and acceleration of the solar wind and to observe the sun's corona. SPARTAN-201 was deployed from Discovery on April 11 and recaptured and berthed in the Orbiter on April 13. Many other smaller payloads flew inside the Orbiter's middeck. One of the most interesting is the ongoing Shuttle Amateur Radio Experiment (SAREX) that allows amateur ham radio operators from around the world to communicate with Shuttle astronauts. During this flight, astronauts made the first space-to-space ham radio contact when they briefly communicated with cosmonauts aboard the Russian space station Mir. Discovery completed 148 orbits during the STS 56 mission and landed on KSC runway 33 at 7:37 a.m. EDT on April 17. The mission duration was nine days, six hours and eight minutes. The crew consisted of Commander **Kenneth Cameron**, Pilot **Stephen Oswald** and Mission Specialists **Kenneth**

Cockrell, Michael Foale and Ellen Ochoa. During the mission, Ochoa became the first woman of Hispanic heritage to fly in space.

The third mission of 1993 began just nine days after the landing of STS 56. Columbia and STS 55 lifted off from Launch Complex 39A at 10:50 a.m. EDT on April 26. The launch was originally attempted on March 22 but was halted after main engine ignition and only three seconds before lift-off when a check valve in one of the vehicle's three main engines was found to be leaking. The launch was safely aborted, and all three engines were removed and replaced prior to the late April launch. The incident marked the first launch pad main engine shutdown since the Shuttle's return to flight in 1988 and was the third such occurrence in the Program's history. The other two engine shutdowns occurred on mission 41D in 1984 and on mission 51-F in 1985.

The main payload of STS 55 was the Spacelab D-2 module, a joint venture between the United States and the Federal Republic of Germany. It marked a unique collaboration in that the flight was controlled from NASA's Johnson Space Center while the mission itself was managed from a control center in Germany. The payload was comprised of 88 experiments in a variety of disciplines that included the materials and life sciences, technology applications, Earth observations, astronomy and atmospheric physics. The landing was originally planned for KSC but was diverted to Edwards Air Force Base [CA] runway 22 due to bad weather in Florida. Landing occurred on orbit 160 at 10:30 a.m. EDT on May 6. The mission duration was nine days, 23 hours and 39 minutes. At the end of the mission, the Shuttle fleet had accumulated more than a year in space: 365 days, 23 hours and 48 minutes. The international flight crew of STS 55 was comprised of Commander **Steven Nagel**, Pilot **Terence (TOM) Henricks**, Mission Specialists **Jerry Ross**, **Charles Precourt** and **Bernard Harris**. The two German Payload Specialists were **Ulrich Walter** and **Hans Schlegel**.

Endeavour was again called upon for STS 57, the year's fourth Space Shuttle flight; liftoff came at 9:07 a.m. from Launch Complex 39B on June 21. STS 57 marked the first flight of the commercially-developed SPACEHAB laboratory. A pressurized module that more than doubles the working area inside the Shuttle, SPACEHAB-1 carried 22 experiments in the fields of materials and life sciences. A wastewater recycling experiment for Space Station was also included inside the module. The flight also marked the end of an era for the European Retrievable Carrier [EURECA] payload. A free-flying science platform that was deployed in space in the summer of 1992, EURECA was retrieved and stowed aboard Endeavour on STS 57. The payload and its experiments were returned to Earth for analysis and will be re-flown in the coming years.

On the fifth day of the STS 57 mission, astronauts **Jeff Wisoff** and **David Low** conducted a five-hour, 50-minute-long spacewalk that continued research into the

abilities of humans in space. Eleven Get Away Special (GAS) payloads were mounted inside Endeavour's payload bay on STS 57. These small payloads require little, if any, action by the astronauts and generally test the effects of microgravity on certain chemicals and substances. The Shuttle Amateur Radio Experiment (SAREX) was again flown on STS 57. Endeavour returned to KSC at 8:52 a.m. EDT on July 1 with a landing on runway 33. The mission duration was nine days, 23 hours and 44 minutes. The six-member crew consisted of Commander **Ronald Grabe**, Pilot **Brian Duffy** and Mission Specialists **David Low**, **Nancy Sherlock**, **Janice Voss** and **Jeff Wisoff**.

Discovery's second and final flight of 1993 was the year's fifth and most trying launch. After three previous attempts - including a main engine shutdown on August 12 - Discovery left Pad B at 7:45 a.m. EDT on September 12. The mission was an ambitious one that included the deployment of a communications satellite, the deployment and retrieval of an astronomical observatory and a spacewalk by two crew members. The Advanced Communications Technology Satellite (ACTS) - considered to be the next generation of communications satellites - was successfully deployed from Discovery on the mission's first day. On the second day of the mission, the astronauts deployed the mission's second primary payload, the Orbiting and Retrievable Far and Extreme Ultraviolet Spectrograph-Shuttle Pallet Satellite (ORFEUS-SPAS) spacecraft. The first in a series of ASTRO-SPAS astronomical missions, ORFEUS-SPAS was an astrophysics observatory sponsored by both Germany and the United States. The payload was controlled and managed by officials at the SPAS Payload Operations Control Center (SPOC) located at KSC. This activity marked the first time that an on-orbit Shuttle payload has ever been completely managed from Florida.

A series of test-centered spacewalks conducted on STS 54 and STS 57 continued on the STS 51 mission. Astronauts **James Newman** and **Carl Walsh** ventured through Discovery's airlock on September 16 to evaluate tools, tethers and foot restraint platforms for their use on December's mission to repair the Hubble Space Telescope. The two astronauts spent seven hours and five minutes floating in Discovery's open payload bay, carefully testing the equipment for its comfort, durability and ease of use. Middeck payloads flown on the STS 51 mission included the IMAX camera and the year's second flight of the KSC-managed Chromosome and Plant Cell Division in Space Experiment (CHROMEX-04) that tests the reactions of microgravity on the development and growth of plants. The first night landing at Kennedy Space Center occurred at 3:56 a.m. EDT on September 22 when Discovery touched down on runway 15. The ship landed at the completion of 158 orbits and nine days, 20 hours and 11 minutes since launch. The STS 51 crew consisted of Commander **Frank Culbertson**, Pilot **William Readdy** and Mission Specialists **James Newman**, **Daniel Bursch** and **Carl Walz**.

Columbia's STS 58 mission, sixth of the year, launched from LC 39B at 10:53 a.m. EDT on October 18. Outfitted with extra fuel and provisions due to the installation of an Extended Duration Orbiter (EDO) pallet, Columbia and her seven-member crew went on to spend more than two weeks in space - a record for the Shuttle Program. The mission's prime payload was the Spacelab Life Sciences-2 (SLS-2) module. The second Shuttle mission dedicated to the study of life sciences, SLS-2 included 14 principal experiments that were divided into four specific study areas: regulatory physiology, cardiovascular/cardiopulmonary, musculoskeletal and neuroscience. Eight of the experiments focused on the astronauts, while the other six were centered on the 48 rodents that flew aboard Columbia during the mission. SLS-2 was the second in a series of Shuttle flights designed to study the effects of microgravity on living organisms. The first SLS mission was conducted on STS 40 during the summer of 1991. Six of the four dozen rodents were decapitated and dissected during the mission, yielding the first animal tissue samples to be collected in space and returned to Earth free of the physiological changes caused by re-exposure to gravity.

Other secondary experiments flown aboard STS 58 included the Shuttle Amateur Radio Experiment (SAREX) and the Portable Inflight Landing Operations Trainer (PILOT), a laptop computer simulator that allowed Shuttle commanders and pilots to maintain proficiency during longer flights. Columbia and crew completed the longest Shuttle mission with a landing on runway 22 at Edwards Air Force Base (CA); the landing occurred on orbit 225 at 10:05 a.m. EDT on November 1. The mission duration was 14 days and 12 minutes. The seven member crew included Commander **John Blaha**, Pilot **Richard Searfoss**, Payload Commander **Rhea Seddon** and Mission Specialists **William McArthur**, **David Wolf**, **Shannon Lucid** and **Martin Fettman**.

The final and most difficult Shuttle mission of the year was Endeavour's STS 61 mission which launched at 4:27 a.m. EDT on December 2 from LC 39B. Seven astronauts spent nearly two years training together and preparing for this mission to repair the Hubble Space Telescope (HST). Deployed into space during the STS 31 mission in 1990, HST was designed and built for on-orbit maintenance. During the course of the STS 61 flight, four astronauts conducted a record-high total of five spacewalks to remove, replace or repair components of the telescope. The spacewalking astronauts were divided into two teams of two. Payload Commander **Story Musgrave** joined up with **Jeffrey Hoffman** to perform three separate extravehicular activities [EVAs] while **Kathryn Thornton** and **Tom Akers** teamed together for two other work sessions outside Endeavour. European Space astronaut **Claude Nicollier** operated the Shuttle's robotic arm and worked closely with both groups of astronauts during all of the spacewalks.

Major work done on HST included the removal and replacement of its solar arrays, Wide Field Planetary Camera II, two rate sensor units and Solar Array

Drive Electronics Unit. A Corrective Optics Space Telescope Axial Replacement was mounted inside the telescope to correct the manufacturing flaw in its main mirror. Every mission objective was completed during the EVAs. The next HST repair mission is slated for 1997. The IMAX camera was also flown on STS 61, acquiring footage of the repair work done on HST and scenes from that effort will be included in the next IMAX film "Destiny" which is set for release next summer. The STS 61 mission ended December 13 with a nighttime landing at KSC on runway 33. Endeavour's touchdown occurred at 12:25 a.m. EST at the conclusion of 163 orbits. STS 61 was the 59th flight since the Shuttle Program began with Columbia's first mission on April 12, 1981. The STS 61 landing was the 18th at KSC. The crew included Commander **Richard Covey**, Pilot **Kenneth Bowersox**, Mission Specialists **Story Musgrave**, **Jeffrey Hoffman**, **Kathryn Thornton**, **Tom Akers** and **Claude Nicollier**. [NASA/KSC Release No. 160-93, Dec. 29, 1993.]

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